



Victorian Audit of Surgical Mortality

VASM

Report

2018



ROYAL AUSTRALASIAN
COLLEGE OF SURGEONS



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Image on the front cover, "*Ghost Gum at Ormiston Gorge*" by Marguerite Russell, acrylic painted on canvas.

The information contained in this annual report has been prepared by the Royal Australasian College of Surgeons, Victorian Audit of Surgical Mortality Management Committee.

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Foreword from VASM

“You wouldn’t just decide to forget about recovering the black box after an air crash. So why should it be thought so strange to want to learn from every accident in health care.” Sir Liam Donaldson, 2001

This is the eleventh series of the Victorian Audit of Surgical Mortality (VASM) reports since the audit began on 1 July 2007, and my first since taking over the Clinical Director’s role from Mr Barry Beiles. Barry left some very big shoes to fill.

The reports have been substantially modified following the recently released review of the VASM by Aspex Consulting⁽¹⁾ and after discussions with Safer Care Victoria (SCV); the annual report has become significantly more focused, and hopefully more reader friendly with more succinct take-home messages. Much of the data that was previously presented in the annual report will be available in the supplementary report which will act more as a reference manual with occasional case report vignettes. A new edition of the consumer report has been prepared to inform the general public about the audit activities and its outcomes with specific recommendations for patients prior to receiving surgical care.

Learning from surgical deaths is important – the perioperative mortality rate is one of the six core indicators for monitoring universal access to safe, affordable surgical care as defined by The Lancet Commission on Global Surgery Australia and New Zealand⁽²⁾ have been world leaders in collecting such data, and from the audit activity we can state that surgery in Victoria is safe, with approximately three deaths for every thousand procedures. This is comparable to data published in both Australasia and the developed world. The vast majority of these surgical deaths occur in elderly patients with multiple co-morbidities, often undergoing emergency surgery. There are still a small number of cases where our assessors find adverse events that were probably preventable. Reassuringly, the data for previous years suggest that the frequency of these cases is decreasing.

Despite the existence of this audit, some clinical management issues still occur repeatedly, driving the VASM to refocus on its educational role in disseminating ‘lessons learned’ to clinical teams and using the hospital governance reports to develop further improvements. Since 2007, eleven Case Note Review Booklets have been produced which, together with the reports, seminars and workshops, have proven to be a valued and informative tool with the surgical readership.⁽³⁾ Together with SCV, we will be exploring new ways of getting the messages for improvement through, and we encourage any feedback or requests for additional information. The audits in Victoria and throughout Australia collect a vast array of data which is made available for researchers – details on how to apply for access are on the VASM website.⁽⁴⁾

All public and private hospitals in Victoria continue to engage with VASM and report their data. In these reports we present the outcomes of the current reporting year where 891 out of 1,777 cases completed the audit process from 1 July 2017 to 30 June 2018.

The Royal Australasian College Of Surgeons (RACS), Australian Orthopaedic Association (AOA) and the Royal Australian and New Zealand College of Obstetrics and Gynaecology (RANZCOG) continue to emphasise the importance of participation in the VASM as part of continuing professional development (CPD) and we are grateful for this support. In 2017, the VASM mandated the electronic submission of data which is anticipated to greatly improve the quality and completeness of our data. We realise that such changes can be challenging and the VASM staff are always available to assist with data completion in a number of ways.

I wish to thank all who have helped us to get where we are. The success of the VASM is dependent upon participating surgeons and hospitals, and the highly efficient, motivated, hard-working staff members at the RACS. I have been heartened by all of the support and appreciation regarding the audit that has been passed on to me since I started as Clinical Director. There is, without doubt, very positive support for the VASM amongst both the surgical and health administrative communities in Victoria, which will enable us to build on past successes and help develop educational aids and policies that make surgery in Victoria even safer in the future.

Yours sincerely,



Associate Professor Philip McCahy, FRACS (Urology) - VASM Clinical Director

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2. About this report

The VASM is part of the Australian and New Zealand Audit of Surgical Mortality (ANZASM), a national network of regionally-based audits of surgical mortality that aim to ensure the highest standard of safe and comprehensive surgical care. The VASM, like its national counterparts, identifies clinical management issues via independent peer-review assessments which are used to actively manage and improve patient safety. Strategies are then developed to redress these issues.

The audit was mandated in 2012 by the RACS as part of the CPD program. Compliance with the audit is determined by the number of cases that completed the cases to finalise the audit process. Detailed information on the VASMs audit process flow chart is reported in the Governance Structure and Data Management sections of the Supplementary Report.

The VASM monitors trends in surgical mortality and clinical management issues in order to identify areas for improvement in the care delivered by health services in Victoria.

This report presents recommendations and key findings for the period **1 July 2017 to 30 June 2018**. Tables and figures provide information obtained between 1 July 2012 and 30 June 2018 in order to illustrate changes over time.

To further assess emerging trends, and to benchmark outcomes of surgical care, case comparisons have been made between VASM and ANZASM.

The VASM has been externally audited three times by Aspex Consulting to assess its functionality. The first review was conducted in 2012 and the third in 2018. The current Aspex Consulting recommendations⁽³⁾ are presented in this report as part of the key findings.

A key finding from the current year's audit is the need for hospitals and surgeons to improve the clinical management issues and preventable outcomes identified in Section 15 '*Outcomes of Peer-Review*'. It was also found that the VASM data could be utilised to meet National Safety and Quality Health Service (NSQHS) Standards. The messages from the key findings are reiterated in Section 7 '*Key recommendations*'. Other areas of improvement for the VASM are outlined in Section 5 '*Future Goals for the VASM*'.

VASM staff would like to acknowledge the support and assistance of the many individuals and institutions that have helped in the development of this project, the details of which are outlined in the Supplementary Report.

3. Executive Summary

Key findings:

Summary of key findings based on **891** peer-reviewed cases from the audit period **1 July 2017 to 30 June 2018**:

- The majority of VASM clinical indicators were comparable to the national audit data.
- More patients were admitted as emergencies with acute life-threatening disease.
- A patient can undergo multiple operative procedures during their hospital stay.
- A surgical consultant was involved in most surgeries, particularly when the patient was readmitted to theatre.
- The top three comorbidities that contributed to death were: cardiovascular, advanced age and respiratory.
- The top three causes of death were: multi-organ failure, sepsis and respiratory failure.
- Delays in surgical diagnosis increased slightly from the previous reporting period.
- Most reported infections were acquired postoperatively.
- Clinical management issues can occur perioperatively during a patient's hospital stay.
- Futile surgery, as reflected in the decision to operate, is one of the top clinical management issues.
- Falls occur mostly at home and at care facilities.

The audit was mandated in 2012 by the RACS as part of the CPD program. Compliance with the audit is determined by the number of cases that completed the cases to finalise the audit process.

The denominator for the current year was 891. Where data was unavailable it was excluded from analysis. It should be noted that data can be unavailable at various stages of the review process, (initial surgical case submission, or subsequent first line and second-line assessment stage). This explains why the denominator may vary for a single measure.

To further assess emerging trends, and to benchmark outcomes of surgical care, case comparisons have been made between VASM and our national counterparts ANZASM. The clinical information on which we base our review was generally provided by the treating consultant themselves and not junior medical staff.

3.1 Hospital admission and operative patient profile

The majority of surgical deaths in this audit occurred in elderly patients with underlying health problems, admitted as an emergency 82.2% (732/891) with an acute life threatening condition often requiring surgery. The actual cause of death was often linked to their pre-existing health status in that the cause of death frequently mirrored the pre-existing illness. Death was most often adjudged to be not preventable and to be a direct result of the disease processes involved; not the treatment provided.

If no surgery was performed, this was due to active decision-making by the patient, family or clinician not to proceed. This decision often occurred in patients admitted as emergency cases with an untreatable clinical problem.

The most frequent operative procedures described were for trauma or acute abdominal pathology. This reflects the high percentage of patients admitted as emergencies and patients can have more than one operation during their hospital stay.

There were 93% (829/891) of patients having at least one operation during their final hospital admission.

Of the patients who had surgery, 14.8% (122/827) had an unplanned return to the operating theatre due to complications.

A consultant was present in theatre in 84.2% (956/1,135) of operations compared to the national rate at 75.0% (2,301/3,066).

During the trending period (2012-2018), a consultant surgeon performed the majority of operative procedures in theatre for 80.6% (6,992/8,672) of operations for the VASM compared with 74.2% (16,875/22,756) nationally, $p < 0.001$. This bias to senior operators is appropriate for this high risk group of patients.

The presence of a consultant was appropriate due to the more challenging nature of emergency cases with greater risks. For further information see [Supplementary Report Appendix 10.9](#).

3.2 Clinical factors to prioritise

Based on national clinical trends, there are specific areas of clinical priority that have been identified and monitored such as deep vein thrombosis prophylaxis use, fluid balance management, critical care management, and clinical management issues in surgical care.

Deep vein thrombosis (DVT) prophylaxis

DVT prophylaxis use is important in the prevention of pulmonary embolus. In 82.0% (712/868) of VASM cases patients received appropriate DVT prophylaxis, compared to 80.2% (2155/2686) nationally.

In 1.3% (11/875) of VASM cases surgical assessors considered the use, or non-use, of DVT prophylaxis to be inappropriate, compared to 1.6% (41/2,625) from the national database. For further information see [Supplementary Report Appendix 10.12](#).

Fluid balance management

In-depth investigations identified a subset of cases where surgeons had reported problems with fluid balance management. While the analysis of this information is ongoing, the dissemination of information to surgeons on fluid management has raised awareness in each state's and territory's surgical community.

In 7.8% (69/887) of cases fluid balance was an issue, comparable to the national data, also at 7.8% (212/2,726).

For further information see [Supplementary Report Appendix 10.18](#).

Critical Care Unit (CCU)

In 33.7% (300/890) of cases CCU was not used. Surgical assessors considered the use or non-use of CCU to be inappropriate in 7.1% (19/266) of cases.

The VASM CCU usage rate was 34.2% (2,293/6,700) compared with the national clinical trend of 37.2% (7,484/20,120), $p < 0.001$. VASM surgical assessors considered that 7.1% (148/2,091) of these cases would have benefited from care at these facilities.

For further information see [Supplementary Report Appendix 10.16](#).

Delay in recognising the symptoms of the deteriorating patient.

Delay in referral to a surgical unit was the most frequent criticism in the audit. Adequacy of preoperative investigations and postoperative care were also frequently cited. Examples of these issues have been featured in a case report booklet⁽³⁾ Other cases that exemplified important clinical issues have also been profiled in the '2019 case note review booklet' which has now been sent to all surgeons. Cases that demonstrated important facets of patient management were selected on the basis of their general educational value to our stakeholders.

The critical importance of early recognition and immediate intervention in deteriorating patients is well recognised internationally. Attendees to seminars on this topic have felt that they were subsequently better able to pick up the signs of a deteriorating patient. For further information see [Supplementary Report Appendix 10.7](#).

3.3 Clinical management issues

Clinical management issues that occur during a patient's hospital stay are identified in this audit. More than one issue can arise during a patient's treatment.

Areas with clinical management issues for the current year are listed below.

There were no criticisms of patient management in 73.7% (654/887) of audited cases.

The peer review process did find faults in the management of 26.3% (233/887) of the audited cases. In the majority of these instances 14.3% (125/877) the criticisms were mild and considered differences in opinion (areas of consideration).

In 5.1% (45/887) of patients, the peer review process concluded significant clinical management errors (adverse events) in management had occurred. The individual criticisms for the case have been directed to the treating surgeons for their reflection, it is important to note that not all clinical management issues are associated with the surgical team.

Unplanned readmissions were reported in 4.8% (42/880) of patients.

Clinically significant infections were present at death in 31.7% (279/879) of cases. This rate is lower than for the national counterparts at 34.0% (925/2,721).

3.4 Potentially preventable clinical outcomes

Potentially preventable clinical outcomes are based on the clinical management issues identified in the VASM peer reviews. For more information see Section 15.

The most common clinical management issues identified were delays, pre, intra and postoperative care and protocol issues. From 1 July 2017 to 30 June 2018, the most common preventable clinical outcomes were preoperative care management issues in 1.5% (13/887) of Victorian cases, see Table 6.

One patient can have more than one clinical management issue associated with the final outcome. There were 11.3% (100/887) of cases with potentially preventable clinical management issues that were definitely or probably preventable. This is lower than the previous audit period in 2016-2017 where 12.9% (154/1,191) of cases with potentially preventable clinical issues were identified, see Table 5.

Potentially preventable outcomes were also examined in healthcare services by the number of clinical management issues identified from the peer review. See [Supplementary Report Appendix 10.23](#).⁽⁴⁾

3.5 Conclusion

The key recommendation made by VASM in this report reflects the six National Safety and Quality Health Service (NSQHS) Standards that can be used by hospitals and health professionals to address areas of clinical practice and patient safety needing improvement.

Overall it is our perception that VASM, along with other surgical science data providing context-aware information, is paving the way for conquering the educational goals ensuring that all surgical Fellows and participating health organisations are accountable for continuing to improve the quality of their services, helping to augment the performance of providers and safeguard high standards of care.

4. Rapid statistics

AUSTRALIA HAS A GOOD AND SAFE HEALTHCARE SYSTEM.

The VASM works to ensure that a high standard of surgical care is maintained in Victoria and that patients receive the best care possible.

VICTORIAN SURGICAL STATISTICS FOR 2018



Hospital Participation

All Victorian public and private hospitals participate.

In 2018, the population of Victoria was approximately 6.4 million.

There were 703,530 hospital admissions involving surgical procedures; approximately 1,777 of which resulted in surgical deaths (0.25%).



Victorian population: 6.4 million

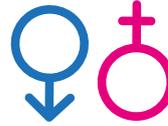
Surgical procedures: 703,530

Auditable mortalities: 1,777

Mortality rate: 0.25%

Elective surgeries: 18%

Emergency surgeries: 82%



Male: 55%

Female: 45%

Mean age: 72

Median age: 77

MOST COMMON COMORBID FACTORS LEADING TO SURGICAL COMPLICATIONS



Cardiovascular

(e.g. heart problems, high blood pressure)



Advanced age

(due to frailty delaying recovery)



Renal

(e.g. diabetes, high blood pressure, kidney disease)



Respiratory

(e.g. asthma, pulmonary disease, smoking)



Neurological

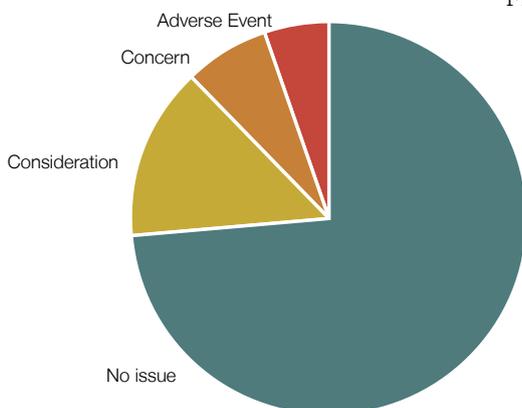
(e.g. structural or biochemical abnormalities in the brain)



Malignancy

(e.g. the presence of a malignant tumour; cancer)

AUDIT OUTCOMES



From the 1,777 surgical deaths, in 891 cases that were audited in 2018, findings showed that:

- 73.7% (654) of cases had safe and appropriate surgical care provided,
- 14.1% (125) of cases where alternative treatment may have been an option,
- 7.1% (63) of cases where improvements could possibly have been made, and
- 5.1% (45) of cases where improvements were required.

5. Future goals for the VASM

Over the past 11 years there has been a great deal of progress in quality and safety monitoring across Victoria. One of the most significant changes during this period occurred after several neonatal deaths raised questions about the health system's capacity to successfully monitor adverse events causing harm to Victorians.

SCV was established to achieve this objective and minimise avoidable harm that might occur across the Victorian public health care system. A key mandate of SCV is to make better use of existing information to inform improvements in patient care, including information arising from the VASM.

Many of the core objectives of SCV are already aligned to the work of the audit. The VASM has developed successful partnerships with clinicians to review and respond to episodes of surgical mortality across the state. A number of ways of improving the VASM audit process were identified, and implementation of these improvements commenced in late 2018.

The recommendations made following the recent Aspex Evaluation are presented here as our new goals, which we see as strengthening the capacity of the VASM. We anticipate further collaboration with our stakeholders, with educational events, and contributions to the quality and safety improvements of surgical interventions across the Victorian health sector. The new goals are:

- Collaboration with SCV for information-sharing in Victoria.
- Presentation of the VASM information to consumers.
- Review of the deidentification of hospital records in Victoria to align with ANZASM's processes.
- Development of a system for expediting cases flagged for urgent multidisciplinary panel review by the new VPCC.
- Development of a fast tracking method for cases that might have a potentially preventable adverse events that can be identified by common underlying surgical admission such as demographic, comorbid factors and operative risk.
- Reporting of information about the care pathway identified in the peer review in feedback to individual surgeons, hospitals and other stakeholders.
- Identification of changes in clinical management implemented by the treating surgeon and the shared care team in response to the peer-review outcome of a case.

6. National Safety and Quality Health Service Standards

This report can assist hospitals with accreditation for the following National Safety and Quality Health Service (NSQHS) Standards⁽⁵⁾ highlighted in the Key Recommendations and the Clinical Risk Management sections.

National Safety and Quality Health Service Standards

VASM Key Recommendations

Standard 1
Clinical Governance Standard



- To improve leadership in patient care.

Standard 2
Partnering with Consumers Standard



- To assess if the decision to operate is appropriate.
- To consider quality of life and end-of-life care.

Standard 3
Preventing and Controlling Healthcare-Associated Infection Standard



- To control and manage infections with appropriate investigation, rapid administration of treatment, and timely involvement of expert teams.

Standard 5
Comprehensive Care Standard



- To improve perioperative management.
- To improve awareness of surgical emergencies and shared-care.
- To involve patients in planning their treatment.
- To reduce falls in hospitals and residential care.

Standard 6
Communicating for Safety Standard



- To improve on documentation of care plans and clinical events.
- To improve on communication amongst health professionals and their patients.

Standard 8
Recognising and Responding to Acute Deterioration Standard



- To act on evidence of clinical deterioration.

7. Key recommendations

The key recommendations reflect the six NSQHS standards outlined in Section 7. The themes listed below are shared-learnings from different specialty-based cases from the audit. These can be used by hospitals and health professionals to address areas of clinical practice and patient safety needing improvement. The case studies in the Supplementary Report are extracts featured from the VASM Case Note Review Booklets in 2017-2018 and Cases of the Month.⁽⁶⁾

7.1 *Improved leadership in patient care*

The NSQHS Standard 1 emphasises clinical leadership, improved governance and culture. Complex cases must have clear and demonstrable leadership in patient management. The treatment plan for each patient should be understood by all involved in their care. The lead clinician must be accountable, responsive, prepared for challenges and must focus on optimal patient care. Senior surgical opinion is essential when dealing with surgical complications and should not be delayed by team hierarchy issues.

7.2 *Futile surgery and end of life care*

VASM recommends planning in accordance with NSQHS Standard 2, encouraging partnership with consumers, and Standard 5, implementation of a comprehensive care plan in collaboration with the patient, when considering surgery as a part of end of life care. A number of surgeons and assessors considered that some of the surgical procedures were futile. Decisions about whether to continue with active treatment and surgery can be very complex in frail patients, particularly when the treatment has a high risk of death or the end of life is near.⁽⁷⁾

7.3 *Infection control*

The NSQHS Standard 3 promotes prevention and control of healthcare-associated infections. The audit shows postoperative infection remains the top cause of infection. Key actions to be taken for control and management are the timely recognition, appropriate investigation, rapid administration of treatment, and timely involvement of expert teams. The VASM endorses the use of current hospital protocols and guidelines to reduce the incidence of infection.⁽⁸⁾

7.4 *Improved perioperative management*

The NSQHS Standard 5 outlines the implementation of a comprehensive care plan and assessments to minimise patient harm from falls and maintain nutrition. VASM recommends appropriate preoperative, intraoperative and postoperative preparation and management that aims to decrease operative complications and promote successful recovery. Delays in investigations or recognising complications can have fatal consequences.

7.5 *Improved awareness of surgical emergencies and sharing of care*

The NSQHS Standard 5 on comprehensive care encourages improvements in shared care. The audit revealed that patients admitted as surgical emergencies are at greater risk where care is shared. All health professionals should increase their awareness of this risk to improve the quality and safety of patient care.

7.6 *Improved communication*

The NSQHS Standard 6 highlights better communication for clinical handover. All health professionals and institutions should actively collaborate and communicate to effectively support an appropriate interchange of information and coordination of patient care at all stages during the admission episode.

7.7 In-house falls prevention

The NSQHS Standard 5 outlines the implementation of a comprehensive care plan and assessments to minimise patient harm from falls and maintain nutrition. The audit revealed that patients admitted as surgical emergencies have a greater risk of falling while in hospital. All health professionals should increase their awareness of this risk to improve the quality and safety of patient care. The VASM endorses the use of current hospital protocols and guidelines to reduce the incidence of in-hospital falls.⁽⁹⁾

7.8 Better documentation of care plans and clinical events

The NSQHS Standard 6 outlines the importance of documentation in the patient healthcare record to ensure patient safety. The case record is an essential tool for identifying the clinical sequence and an appropriate clinical management plan. As such, the case record must contain clear and accurate documentation of events and plans. There are ongoing issues with the quality of the data provided by some treating surgeons and their teams. In addition, greater attention to detail in completing the VASM surgical case form (SCF) would help improve data quality by minimising missing data and reducing the workload of colleagues who have agreed to act as first- and second-line assessors. The newly established compulsory move to the electronic interface in 2017 will facilitate improvements of the data quality received.

7.9 Action on evidence of clinical deterioration

The NSQHS Standard 8 highlights the need for action to be taken when clinical deterioration occurs. Clinical deterioration is an issue that is recognised throughout Australia and internationally. When clinical deterioration occurs, and no clear cause is identified, consideration should be given to causes outside the treating surgeon's specialty or expertise. Clinical findings must be considered alongside the results of investigations. Clinical deterioration must be acted upon as well as recorded and, in line with recommendation 7.2, futile surgery should be avoided.⁽⁷⁾

8. Audit numbers

8.1 Verification of audit numbers

The Victorian Admitted Episodes Dataset (VAED) indicated that from 1 July 2017 to 30 June 2018, in total 703,530 patients received procedural or surgical care in Victorian public and private hospitals. The VASM received 1,777 notifications of deaths that have been associated with surgical care.

The audit process is dependent upon receiving notifications of death from participating hospitals. This requires each hospital to prepare and submit a list of deaths that have occurred while the patient was under the care of a surgeon. In these circumstances the discharging unit would usually be recorded as surgical; however, in some instances a patient who has received surgical care may not be under the care of a surgeon at the time of death.

In parallel with the VASM audit process, hospitals must also submit data to the VAED, which is maintained by the Department of Health and Human Services (DHHS). This is a robust database providing the case-mix information required for hospital activity-based funding.⁽¹⁰⁾

The information identifies individual patient-care episodes to diagnosis-related groups (DRGs). These DRGs are specialty-specific and provide an alternative source of mortality data. The DHHS has provided the VASM with a list of procedural deaths that occurred in patients with surgical DRGs over the period 1 July 2012 to 30 June 2018.

Table 1: Trend of mortalities identified by VAED and VASM in 2012-2018

Audit period	Total interventional procedures	VAED reported interventional mortalities	VASM reported surgical mortalities	VASM reported mortality per 1,000 interventional procedures
2012-2013	630,713	1,882	1,558	2.47
2013-2014	663,762	1,924	1,613	2.43
2014-2015	672,957	1,966	1,700	2.53
2015-2016	679,676	2,009	1,720	2.54
2016-2017	693,970	2,018	1,764	2.54
2017-2018	703,530	2,041	1,777	2.53
Total	4,004,608	11,840	10,132	2.53

Note: VAED: Victorian Admitted Episodes Dataset.

Comments:

The VAED indicated that from 1 July 2017 to 30 June 2018, in total 703,530 patients received procedural or surgical care in Victorian public and private hospitals. Of these, 0.3% (1,777/703,530) resulted in auditable mortalities reported to the VASM.

The VASM received 1,777 notifications of deaths that were associated with surgical care. Cases that were sent for completion by the treating surgeon that were pending from the previous audit period 2016-2017 have been included in the current audit period for analysis. This report focuses on the clinical outcomes of the 891 closed cases that completed the audit process and these outcomes are compared to previous years for trending.

In the current audit year, 19.8% (351/1,777) of the reported mortalities were excluded from further analysis due to terminal care admissions. In addition, 90.6% (318/351) cases were excluded as lost to follow-up because were reported to the VASM as errors or cases were wrongly attributed to surgical units, when the surgeon moved interstate, abroad, retired, was noncompliant, or the medical records were unattainable from the hospital.

The time frame given for each step of the audit process is 21 days. This includes all facets of the data collection forms such as the: Surgical Case Form (SCF), First-Line Assessment (FLA) and Second-Line Assessment (SLA). Obtaining medical records and documentation de-identification processes can take up to 4 months for complex cases. The return rate for SCFs from 2017-2018 was 79% (1,404/1,777). The remainder of the cases are pending return and will be reported in future publications.

The specialties with the most notifications in 2017-2018 were: General Surgery (35.7%, 634/1,777), Orthopaedic Surgery (19.9%, 353/1,777), Neurosurgery (12.9%, 229/1,777), Cardiothoracic Surgery (12.9%, 229/1,777) and Vascular Surgery (7.9%, 140/1,777).

9. Audit compliance

Hospitals provide notifications of death on a regular basis and this is the main trigger for the audit process to begin. Compliance is the return rate of SCFs by the nominated surgeon for deaths notified to the VASM by the hospitals. From 1 July 2017 to 30 June 2018, the VASM received 79.0% (1,404/1,777) surgical case record forms. The larger specialties such as General Surgery and Orthopaedic Surgery were the most compliant.

All hospitals that provide surgical services participate and comply with the audit requirements. To comply with the audit process, Fellows of RACS must not only agree to participate, but also return completed SCFs and assessment forms in a timely, accurate and complete manner. Thus, there is a difference between surgeon participation and compliance.

Participation is the receipt of confirmation that the surgeon will participate; recorded since 2012 when RACS mandated this activity for all Fellows. Compliance is the return rate of SCFs by the nominated surgeon for deaths notified to VASM staff by the hospitals.

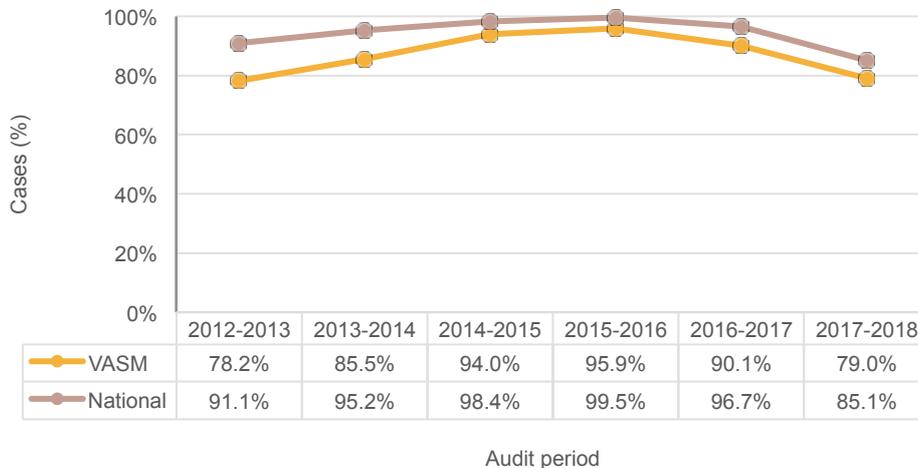
The RANZCOG, AOA and Australian and New Zealand College of Anaesthetists (ANZCA) boards have approved formal collaboration with the ANZASM in the audit process.

The VASM audit also collects data on all deaths occurring after a gynaecological surgical procedure. The Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM) continue to separately review obstetric and neonatal deaths. The Victorian Consultative Council on Anaesthetic Mortality and Morbidity (VCCAMM) collaborates with the VASM to collect anaesthetic deaths in Victoria.

9.1 Audit Compliance

The following section summarises the notifications and compliance by all hospitals and surgeons in the reporting period, 1 July 2017 to 30 June 2018 and the audit status of these notifications. Figure 1 illustrates trending in Victorian and national hospital and surgeon compliance changes over time.

Figure 1: Compliance by return rate of SCF to VASM compared to the national data in 2012-2018



Note: n=8,613 surgical case forms returned out of 9,880 audited cases reported from 1 July 2012 to 30 June 2018.
SCF=surgical case form.

See [Supplementary Report Appendix 10.3](#) for numbers for the above graphs and data on notified deaths reported by surgical specialty to VASM in 2012-2018.

Comments:

- For the reporting period, 2017-2018, hospitals notified the VASM of 1,777 surgical deaths.
- Surgeons in Victoria completed the surgical case form (SCF) in 1,404 of the 1,777 notified deaths, resulting in an overall return rate of 79.0%.
- The Victorian average for completed SCFs is 86.8% (n=8,582) and slightly lower than the national average is 92.8% (n=24,147). The remainder of cases are still in progress and compliance for 2018-2019 will be monitored by VASM
- The peer assessment rate for 2017-2018 data will increase as pending cases undergo the full audit process.
- General Surgery, Orthopaedic Surgery and Cardiothoracic Surgery were the top three specialties with completed SCFs.
- The smaller specialties such as Otolaryngology Head and Neck Surgery, Neurosurgery, Ophthalmology, and Obstetrics and Gynaecology were largely compliant.
- The larger specialties such as General Surgery and Orthopaedic Surgery were the most compliant.
- For the full report on audit numbers see the *Supplementary Report Appendix 10.3*.

10. Characteristics of audited deaths

A higher percentage of admissions to hospital were emergency, with a larger proportion being male, with a median age of 77 years, mostly graded as ASA 4. These patients went to surgery where there was considerable or expected risk of death, and this figure is comparable to the national data.

Table 2: Characteristics of audited deaths compared to the national data in 2017-2018

Audit Period	VASM		National	
Number of audited deaths	n=891		n= 2,746	
Number of operative cases	n=828		n= 2,232	
Median age of patients in years (IQR)	77 years	(65 – 86 years)	76 years	(65 – 85 years)
Gender	Male 55.3%	: Female 44.7%	Male 56.4%	: Female 43.6%
Admission status	Elective 17.6%	: Emergency 82.4%	Elective 14.8%	: Emergency 85.2%
ASA grades	ASA 1-2	6.0%	ASA 1-2	6.2%
	ASA 3	27.1%	ASA 3	30.7%
	ASA 4	50.6%	ASA 4	48.3%
	ASA 5-6	16.3%	ASA 5-6	14.8%
Risk of death prior to surgery	Expected	12.2%	Expected	12.1%
	Considerable	48.2%	Considerable	49.4%
	Moderate	24.8%	Moderate	25.8%
	Small	12.1%	Small	10.1%
	Minimal	2.6%	Minimal	2.5%
Most common comorbid factors	Cardiovascular	22.5%	Cardiovascular	21.8%
	Age	21.3%	Age	21.2%
	Respiratory	11.3%	Respiratory	11.4%
	Renal	9.1%	Renal	9.1%
	Advanced malignancy	8.0%	Advanced malignancy	7.4%
	Diabetes	7.0%	Diabetes	7.2%
	Other	7.7%	Other	8.4%
	Neurological	6.3%	Neurological	6.7%
	Obesity	3.9%	Obesity	3.9%
	Hepatic	2.8%	Hepatic	2.9%
Number of operative procedures performed	3 or more	7.4%	3 or more	6.3%
	2	13.4%	2	11.5%
	1	72.2%	1	63.5%
	0	7.0%	0	18.7%

Notes: Comorbidities describe coexisting medical conditions or disease processes that are additional to the primary diagnosis. ASA: American Society of Anaesthesiologists. The ASA physical status classification system is an international measure of patient risk used by anaesthetists.

Where data was unavailable it was excluded from analysis, accounting for differences in the denominator (VASM n=891, national n=2,746). Each audited case can have more than one operation. In Table 2, the number of operative procedures performed are compared between the VASM and national data. For VASM data, the missing data are eleven cases.

Comments:

- The demographic data remained similar during the audit period 1 July 2017 to 30 June 2018.
- The risk of death described as 'considerable' or 'expected' prior to surgery remains high at 60.5% (494/817) in Victoria and 61.5% (1,358/2,207) nationally.

The American Society of Anaesthesiologists (ASA)⁽¹¹⁾ classification measures patients' fitness prior to surgery. Data definitions of ASA status are outlined in the [Supplementary Report Appendix 5.7](#).

11. Establishing the cause of death

The most frequent causes of death from 1 July 2012 to 30 June 2018 were multi-organ failure, cardiac event and respiratory failure, which have remained within the top five reported causes of surgical death since 2012. Cases for postmortem referrals remains low although the majority of postmortems were conducted on emergency-admitted patients.

The cause of death recorded by the treating surgeon is based on the clinical course of the patient and any relevant supporting evidence from investigations. Where doubt exists around the circumstances leading to death, the case will be referred to the coroner. From 1 July 2012 to 30 June 2018, there were 7,721 conditions perceived to have caused death. The most frequently cited were multiple organ failure at 12.7% (978/7,721), cardiac event at 12.6% (970/7,721), respiratory failure at 11.6% (892/7,721), septicemia at 11.4% (882/7,721) and pneumonia at 10.1% (777/7,721).

The cause of death status count excludes contributory factors such as palliative care (n=78), hypotension (n=21) and hypoxaemia (n=14). In many cases this reflects the terminal event and not the underlying pathology, which has been identified as an issue in terms of the accurate completion of death certificates. At times the cause of death is related to existing comorbidities and will contribute to the final outcome".⁽¹²⁻¹⁶⁾

By comparing trends in the number of cases referred for coronial postmortems it was found that between 2012 and 2017 only 19.3% (1,124/5,823) of VASM cases went for review. This rate remains unchanged when including the most recent audit period (2012-2018) at 19.1% (1,284/6,714).

Annual trends show a slight decrease between 2016-2017 and 2017-2018, from 20.3% (244/1,202) to 18.0% (160/891) of cases being referred to the hospital postmortem and coronial review.

The postmortem rate remained constant during the full audit period, however the reason why it continued to be low is unknown. Postmortems were performed in 18.0% (1,181/6,546) of elective cases and 19.6% (1,284/6,546) of emergency cases. An Australian study that examined clinicians' understanding of reportable death to the Victorian Coroners has highlighted that postmortems provide valuable educational information and provide insights for areas of concern.⁽¹⁹⁾ Hence, the continuing low rates of referral are of concern.

During the validation process for the causes noted by the treating surgeon, the cause of death identified by the coroner's office and by the VASM had 82% agreement when the coronial finding is used as the gold standard.⁽¹⁸⁾

For more details [Supplementary Report Appendix 10.5](#).

12. Peer-review process

From 1 July 2012 to 30 June 2018, all audited cases underwent a first-line peer review with 15% referred for second-line peer review. There was a slight decrease in in-depth peer review of cases in 2017-2018 due to insufficient information being provided by the treating surgeon. The need for SLA has decreased over time, this is in part due to the improved quality of the information provided in the SCFs returned by treating surgeons.

FLAs were completed in 6,714 cases and 18.3% (1,230/6,714) of those cases required an in-depth SLA. The SLA referral rate for the current period (2017-2018) was 15.0% (134/891).

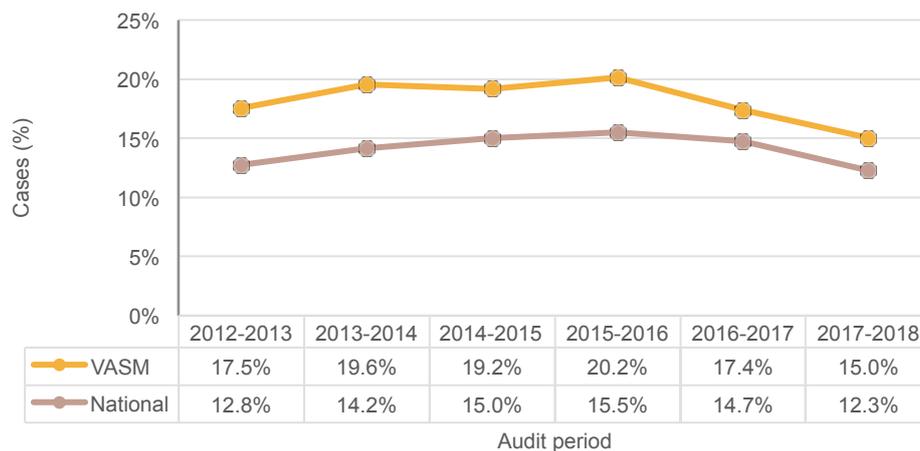
Each first-line assessor was asked to indicate if the treating surgeon had provided adequate information to allow a conclusion to be reached. If the information was deemed inadequate, then an SLA was requested. Other triggers for requesting an SLA are:

- a more detailed review of the case is required, which could better clarify events leading up to death, and
- death is unexpected, for example in a young, fit patient with benign disease or a day surgery case.

The information provided in the SCFs has increased since the beginning of the audit, but still requires improvement. SLAs required for other triggers may represent suspected issues of clinical management. The reasons given for referral for SLA are provided in Figure 2.

12.1 Reason for referral for second-line assessment

Figure 2: Proportion of audited deaths that underwent an SLA compared to the national data in 2012-2018



Note: n= 1,230 cases out of 6,714 patients referred for SLA peer review reported from 1 July 2012 to 30 June 2018.
n=134 cases out of 891 cases reported from 1 July 2012 to 30 June 2018.

SLA: Second-line assessment.

See [Supplementary Report Appendix 10.4](#) for raw numbers for the above graph.

Comments:

- From 1 July 2012 to 30 June 2018, the percentage of cases sent for second-line assessment was 18.3% (1,230/6,714).
- In 2017-2018, 15.0% (134/891) of cases were sent for a second-line peer review due to insufficient information and/or further investigation.
- Criticisms included poor medical admission notes, missing imaging, missing reports, missing transfer notes and follow-up records, and unsatisfactory description of the surgical procedure. Comprehensive and legible hospital case notes are an important record of what occurred during a patient's treatment.
- The percentage of cases referred for SLA due to insufficient information has dropped from 12.5% (125/997) in 2012-2013, to 11.3% (100/888) in 2017-2018.

- In 2017-2018, 85.0% (755/889) of cases were not referred for SLA by the first-line assessor, as no major clinical management issues were identified by the FLA. In 24.6% (33/134) of cases SLA requests were made based on the need for a more detailed review of perceived issues of management.
- Despite improvements in the quality of the data provided to the VASM, ongoing issues remain with the quality of the data provided by a minority of treating surgeons. Greater attention to detail in completing the SCF would help reduce the workload of colleagues who have agreed to act as first- and second-line assessors. The compulsory move to the electronic interface in 2017 will facilitate the improvement of the data quality received.
- For more details on peer review process see [Supplementary Report Appendix 10.4](#).

13. Clinical risk management

Establishing surgical diagnosis after review of test results, operations and any postmortems can indicate the patient's condition prior to surgery. Compared to 2016-2017, in 2017-2018 there was a slightly decreased need to send cases for second-line peer review due to insufficient information from the treating surgeon.

13.1 Establishing the surgical diagnosis

From 1 July 2012 to 30 June 2018, the most frequent surgical diagnoses were: fracture of the neck of femur (26.7%, 949/3,549), intestinal obstruction (23.2%, 824/3,549), cardiac disease (9.7%, 345/3,549) and malignancy (9.4%, 334/3,549).

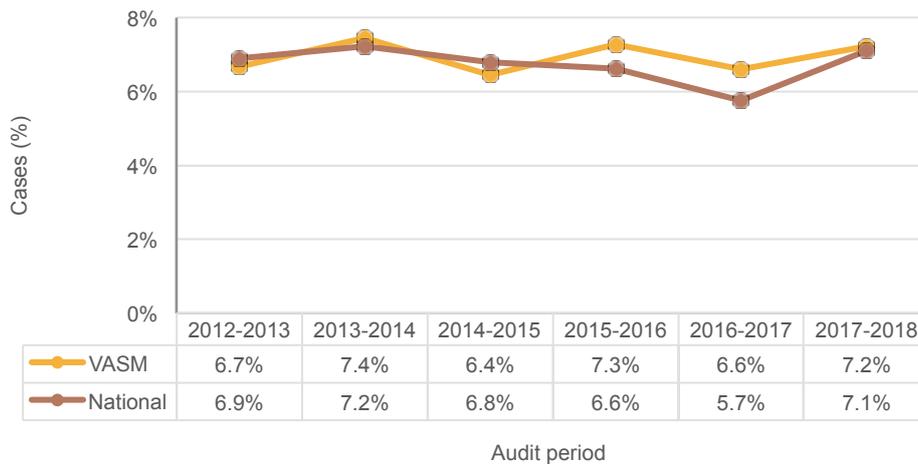
The proportion of malignancy cases in the current audit period (2017-2018) remained stable at 23.1% (112/484) relative to that of the previous audit year (2016-2017) at 23.2% (159/624).

13.2 Delay in surgical diagnosis

Early diagnosis is critical in preventing surgical complications or deterioration, particularly in a frail population. In 2017-2018, the delay in diagnosing a patient who eventually had surgery was slightly higher compared to previous years.

Treating surgeons were asked to record any perceived delays in establishing a diagnosis and proceeding to definitive treatment as shown in the figure below.

Figure 3: Audited deaths with delay in surgical diagnosis compared to the national data in 2012-2018



Note: n=6,680 out of 6,714 patients with delays in surgical diagnosis from 1 July 2012 to 30 June 2018.

Data not available: n=34.

From 12 March 2015 the data collection changed from gathering data on both delay and errors in surgical diagnosis, to focus only on delay.

See [Supplementary Report Appendix 10.7](#) for raw numbers for the above graph.

Comments:

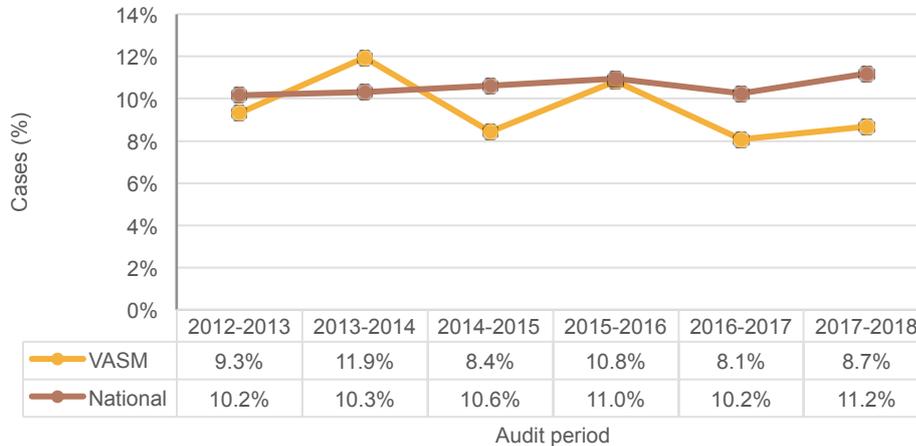
- From 1 July 2012 to 30 June 2018, diagnostic delays were identified by the treating surgeons in 6.9% (463/6,680) of audited deaths in Victoria and this data was comparable to the national findings of 6.7% (1,346/20,053).
- In 2017-2018, surgeons reported delays in diagnosis in 7.2% (64/885) of cases in which the patient underwent an operation.

- It is important to note that delays are not always attributable to the surgical team. As published in a review in the United Kingdom of care received by elderly patients undergoing surgery, delay between admission and operation was related to risk assessment determined by the clinical team.⁽¹⁹⁾
- For more details on reported delays in surgical diagnosis see *Supplementary Report Appendix 10.7*.

13.3 Delay in transfer to a hospital

A delay experienced during the transfer of the patient to the reporting hospital is reviewed and analysed. There was a small proportion of patients requiring transfer to another hospital who experienced delays, and where there was inappropriate transfer or level of care, and insufficient clinical documentation. Delays and problems in transfer can cause risks and challenges for shared surgical care. There is still a need to improve the safety of patient care in such settings and implement clear communication channels between relevant patient care teams.

Figure 4: Audited deaths with transfer to a hospital with delay compared to national data in 2012-2018



Note: n=1,403 cases out of 6,714 patients have delays in transfer reported from 1 July 2012 to 30 June 2018.
Data not available: n=93.
See [Supplementary Report Appendix 10.8](#) for raw numbers for the above graph.

Comments:

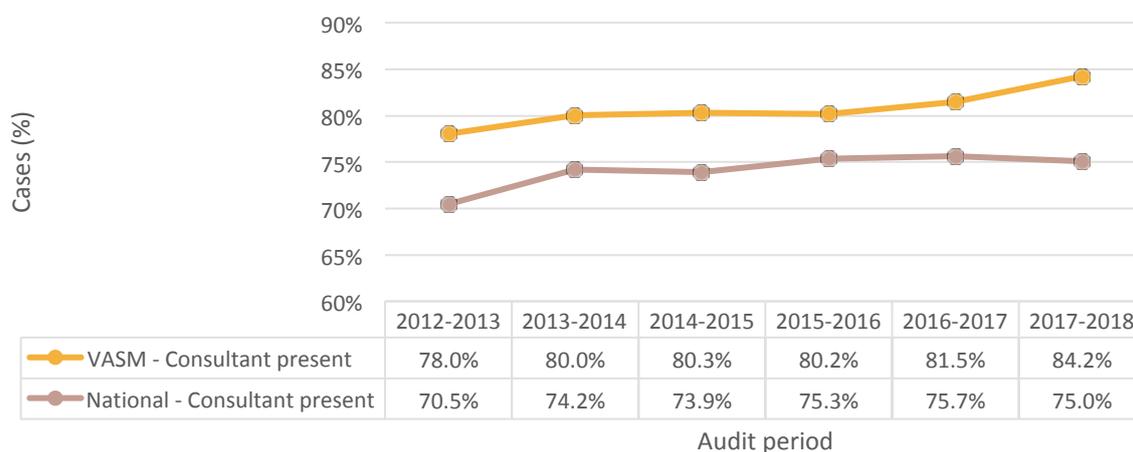
- From 1 July 2012 to 30 June 2018, 20.9% (1,403/6,714) of patients were transferred to another hospital. This rate has been constant throughout the audit.
- An inappropriate level of care during transfer was identified for 3.4% (48/1,398) of transfer cases; the rate of inappropriate transfers was 5% (70/1,412), while inadequate clinical information and documentation was provided to the receiving hospital in 4.9% (68/1,395) of transfer cases.
- In 2017-2018, 184 patients were transferred to a hospital, and 8.7% (16/184) of those were reported to have had delays in the transfer.
- The overall trend in transfer problems were more frequently seen in rural regions at 16.3% (31/190) than in metropolitan areas, at 8.5% (103/1,212) in 2012-2018.
- Trends in Victoria compared to the national findings, indicated a small difference in transfer delays of 9.6% (134/1,403) of Victorian patients compared to 10.6% (504/4,767) of patients from the national audit findings.
- A major reason for transfer is to provide a higher level of care, such as access to critical care support, and it is expected that rural hospitals will have a greater need to transfer patients.
- RACS recognises the need for clinical support in rural areas, where appropriate care and availability of well-trained doctors is often limited.⁽²⁰⁾
- RACS is currently looking into improving the surgical training program by assisting rural hospitals to meet the training standards that are currently designed for metropolitan training hospitals. They are also encouraging more highly trained surgeons to relocate and practice in rural settings.⁽²¹⁾
- For more details on transfer issues see [Supplementary Report Appendix 10.8](#).

14. Profile of operative procedures

The role of the treating surgeon is to take responsibility for the overall success of the operation. The treating surgeon needs to ensure that the operation proceeds smoothly, with the lowest possible risk of complications, the appropriate use of DVT prophylaxis and CCU, monitoring of fluid balance, a reduction in the number of unplanned returns to theatre, and involvement of the senior consultant, especially in a training environment.

The following section examines the frequency of a consultant being present in theatre or being the most senior surgeon performing the procedures.

Figure 5: Operation with the consultant surgeon present in theatre compared to national data in 2012-2018



Note: n=8,672 episodes out of 6,714 patients had operative treatment reported from 1 July 2012 to 30 June 2018. See [Supplementary Report Appendix 10.9](#).

Comments:

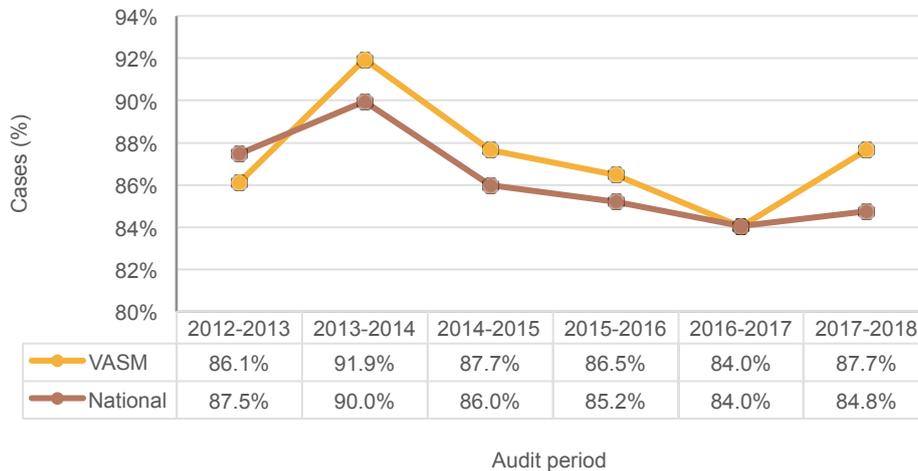
- A patient can have multiple surgical procedures during the same hospital admission.
- In 93.0% (828/890) cases, the patient had at least one operative procedure in the current audit period.
- As a patient can undergo multiple procedures during the same admission, and at the same surgical session, a total of 8,672 separate procedures/operations were performed
- Over this period, the consultant surgeon was present in theatre, i.e. operating, assisting or supervising the operation in 80.6% (6,992/8,672) of audited operations in Victoria. This rate was slightly higher than the national data in 74.2% (16,875/22,756).
- For patients who were admitted through emergency departments, 23.3% (1,407/6,029) had surgery within two hours of admission, 39.8% (2,400/6,029) had surgery within 24 hours, while 36.9% (2,222/6,029) had surgery more than 24 hours after admission, for the years 2012-2018.
- During the audited period, there was a decrease from 37.7% (423/1,121) in 2016-2017 to 35.2% (291/827) in 2017-2018 of emergency admissions to a surgical unit that required surgery within 24 hours of admission. Strategies to address the associated scheduling problems are a priority for the government, surgeons and hospitals to implement.⁽²²⁻²⁴⁾
- For more details on operative procedures and consultant present in theatre see [Supplementary Report Appendix 10.9](#).

14.1 Elective surgery performed as planned

Elective surgical procedures are surgeries that are scheduled in advance because these do not involve an immediate medical emergency.

There was a slight increase in patients having elective surgery performed in the current audit period compared with the previous years.

Figure 6: Proportion of elective admissions with elective surgery performed in 2012-2018



Note: n= 1,030 out of 6,714 patients had elective admissions reported from 1 July 2012 to 30 June 2018.

Data not available: n=43.

See [Supplementary Report Appendix 10.10](#) for raw numbers for the above graph.

Comments:

- In 2017-2018, patients had elective surgery performed in 87.7% (135/154) of cases of elective admission. This figure was a slight increase compared to 84.0% (184/219) of cases in 2016-2017.
- For more details on elective operative admissions see [Supplementary Report Appendix 10.10](#).

14.2 Deep vein thrombosis prophylaxis

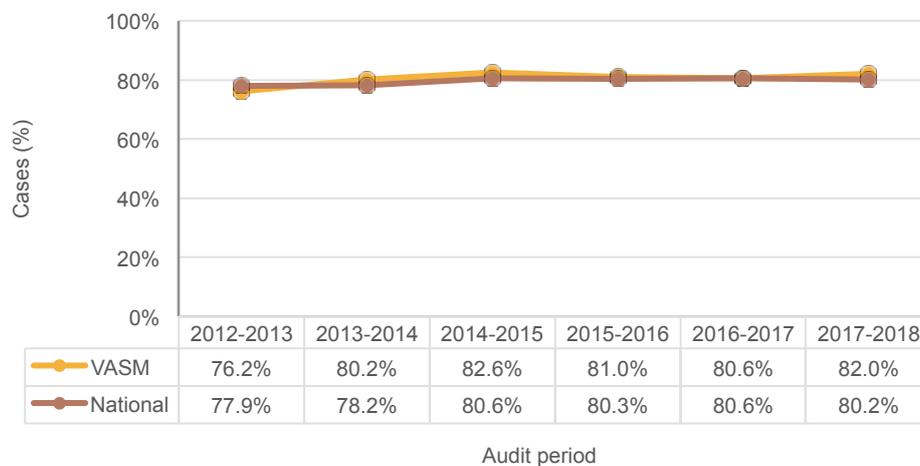
From the peer review, usage of DVT was considered appropriate in the current audit period and this finding is comparable to the national audit. Overall, heparin was the most administered prophylaxis, however in the current audit period there was an increase in decisions made by the treating teams to actively withhold DVT usage compared to the previous audit year. New guidelines on venous thromboembolism (VTE) promote early investigations in the management of DVT. ^(25,26)

The use of DVT prophylaxis was reported by the treating surgeon to the VASM.

There are effective pharmacological and mechanical prophylaxis options available; however, pulmonary emboli (PE) remain a major cause of mortality in hospital patients across Australia.

The appropriate usage of DVT prophylaxis is outlined in the *Clinical Practice Guidelines for the Prevention of Venous Thromboembolism in Patients Admitted to Australian Hospitals*. ^(25,26) These are reviewed and updated periodically to facilitate the best care available to patients. Clinicians are recommended to refer to the guidelines, however, this is subject to the judgement of clinicians caring for individual patients and the patients' own preferences.

Figure 7: DVT prophylaxis use during the audit period compared to national data in 2012-2018



Note: n= 5,309 out of 6,594 patients had DVT prophylaxis used in 8,672 operative episodes reported from 1 July 2012 to 30 June 2018. Data not available: n=120.

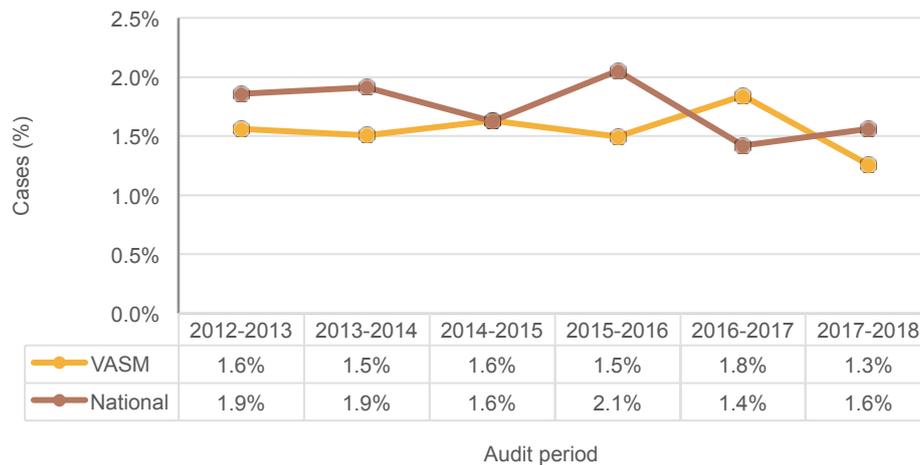
See [Supplementary Report Appendix 10.12](#) for raw numbers for the above graph.

DVT: deep vein thrombosis.

Comments:

- From 1 July 2012 to 30 June 2018, an overall 80.5% (5,309/6,594) of cases involved use of DVT prophylaxis. The appropriate usage of DVT prophylaxis was similar to the national data at 79.6% (15,798/19,835).
- In patients where DVT prophylaxis was used, overall 44.1% (4,094/9,291) was heparin, followed by Thrombo-Embolic Deterrent (TED) stockings at 27.7% (2,577/9,291) and sequential compression at 19.8% (1,837/9,291).
- There was a slight increase of DVT prophylaxis from 80.6% (949/1,177) in 2016-2017 to 82.0% (712/868) of cases observed in 2017-2018.
- The use of heparin slightly increased from 43.7% (744/1,702) in 2016-2017 to 44.0% (566/1,286) in 2017-2018. Aspirin was shown to be a valid therapeutic agent in thromboprophylaxis and was the least utilised prophylaxis at 4.3% (397/9,291) compared to heparin, TED stockings and sequential compression devices.
- The type of prophylaxis used is subject to the judgement of clinicians caring for individual patients.
- Newer guidelines on VTE including DVT and pulmonary embolism promotes a thorough investigation in the management of VTE. ⁽²⁷⁾

Figure 8: Inappropriate DVT prophylaxis treatment as viewed by the assessor in 2012-2018



Note: n= 1,285 patients not receiving prophylaxis in 8,672 operative cases. Reported from 1 July 2012 to 30 June 2018. Data not available: n=130. See [Supplementary Report Appendix 10.12](#) for raw numbers for the above graph. DVT: deep vein thrombosis. FLA: first-line assessment; SLA: second-line assessment.

Comments:

- From 1 July 2012 to 30 June 2018, an overall 25.1% (322/1,285) of patients that had an operative procedure received no prophylaxis. In most of these cases, the decision was made by the treating team.
- There was an increased rate of actively withholding DVT usage by the treating team from 25.0% (52/208) in 2016-2017 to 42.4% (61/144) in 2017-2018.
- From the peer reviews, 85.3% (5,619/6,584) of assessors indicated patients would have benefited from DVT prophylaxis. While only 1.6% (103/6,584) of assessors indicated the decision on the use of DVT prophylaxis was inappropriate.
- Assessors could not accurately assess the appropriateness of the decision to withhold DVT in 130 of the cases due to insufficient evidence in the audit documentation. The tendency of second-line assessors to be more critical than first-line assessors of clinical management events was foreseeable, as second-line assessors can review patient medical records.
- For more details on DVT assessment outcomes see [Supplementary Report Appendix 10.12](#).

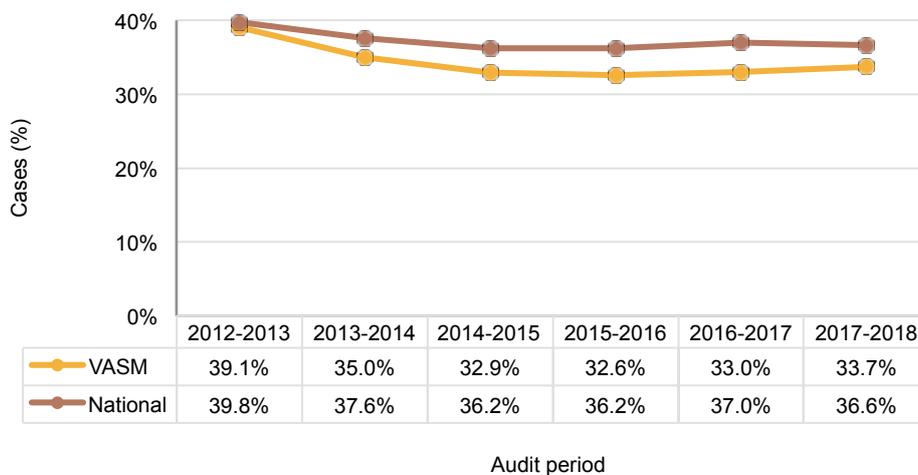
14.3 Adequacy of provision of critical care support to patients

Critical care is essential to support acute medical admissions as they represent the most seriously ill group of patients. From 1 July 2012 to 30 June 2018, the overall finding from the peer reviews highlighted that some patients would have benefited from the use of critical care facilities. The rate of patients not admitted to CCU has remained constant since 2014-2015. It should be acknowledged that not all hospitals have critical care services and should therefore triage patients accordingly.

Ideally, CCU such as intensive care or high dependency units, should be co-located with the emergency department and surgical departments, especially in larger acute hospitals. A close working relationship between the surgical team and the critical care unit is essential, although not all surgical patients require critical care support.

The treating surgeon was asked to record if their patient received critical care support before or after surgery. The first- and second-line assessors also reviewed the appropriateness of the use of critical care facilities for patients.

Figure 9: Audited deaths without use of critical care unit compared to national data in 2012-2018



Note: n=4,407 out of 6,700 patients had critical care support in 8,672 operative episodes reported from 1 July 2012 to 30 June 2018.
Data not available: n=14.
See [Supplementary Report Appendix 10.13](#) for raw numbers for the above graph.

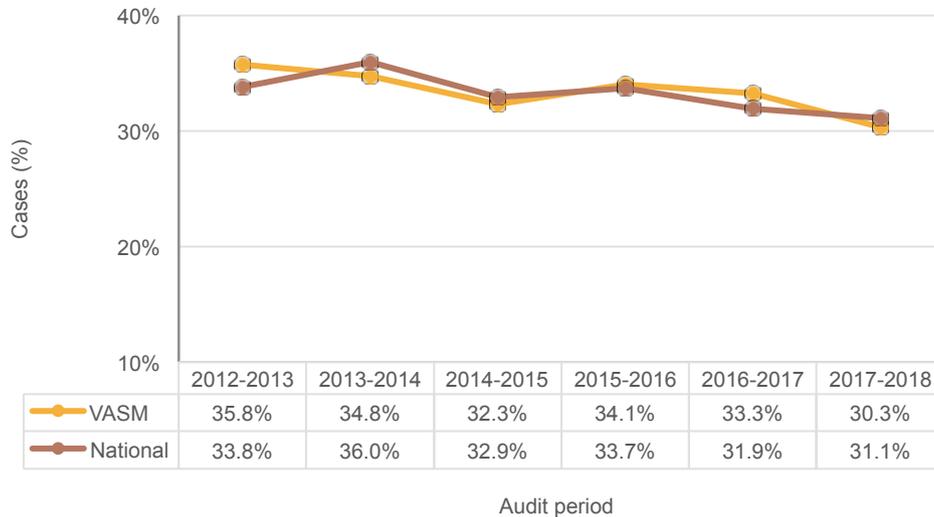
Comments:

- From 1 July 2012 to 30 June 2018, audited deaths without any use of critical care support in Victoria was 34.2% (2,293/6,700).
- The rate of patients not admitted to CCU has remained constant since 2014-2015 at 32.9% (409/1,242) to 33.7% (300/890) in 2017-2018.
- The following points are based on the overall findings on usage of CCU from 2012-2018:
 - Surgical assessors considered that 7.7% (151/1,950, data not available: n=202) of these cases would have benefited from care in those units.
 - The treating surgeon perceived that a lack of critical care support was potentially an issue in 2.3% (36/1,551) of cases.
 - Assessors (both first- and second-line) reported that 9.0% (140/1,551) of patients who did not receive critical care support were likely to have benefited from it, which, although small, is more than double that identified by the treating surgeon.
- For more details on CCU care see [Supplementary Report Appendix 10.13](#).

14.4 Postoperative Complications

Some complications following complex surgery are to be expected due to the pre-existing comorbidity profile, surgical risk status and the nature of the disease being treated. The overall trend of VASM data from 1 July 2012 to 30 June 2018 was comparable to the national findings. The postoperative complications rate was slightly lower in 2017-2018 compared to the previous audit period.

Figure 10: Audited operative deaths with postoperative complications compared to national data in 2012-2018



Note: n=2,041 out of 6,105 patients had postoperative complications in 8,672 operative episodes reported from 1 July 2012 to 30 June 2018. Data not available: n=56.

See [Supplementary Report Appendix 10.14](#) for raw numbers for the above graph.

Comments:

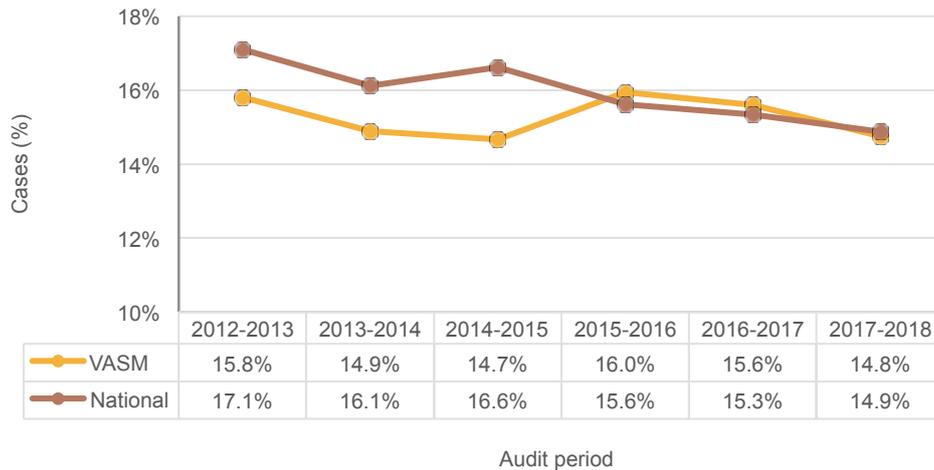
- From 1 July 2012 to 30 June 2018, 66.6% (4,064/6,105) of patients who underwent operative treatment had no complications. In 2017-2018, this rate was 69.7% (570/818) which is comparable to the national rate of 68.9% (1,521/2,208) of patients in the same year.
- Surgeons reported postoperative complications in 33.4% (2,041/6,105) of audited operative deaths in Victoria; comparative to the national findings in 33.3% (5,334/16,022).
- Surgeons reported delay in recognising postoperative complications in 6.6% (124/1,889, data not available: n=152) of deaths in 2012-2018.
- In Victoria the rate of postoperative complications was slightly lower at 30.3% (248/818) in 2017-2018 as compared to 33.3% (368/1,106) of cases in 2016-2017.
- For more details on complications see [Supplementary Report Appendix 10.14](#).

14.5 Unplanned Return to Theatre

During the patient's hospital stay an unplanned return to the operating room is usually necessitated by the development of a complication requiring further surgery. The overall figures from 1 July 2012 to 30 June 2018 are slightly lower compared to the national audit data.

Some complications following complex surgery are to be expected due to the pre-existing comorbidity profile, surgical risk status and the nature of the disease being treated. However, a high rate of return to the operating room can indicate that the care being provided could be improved, and it is an overall goal of the VASM with SCV and DHHS to see this trend decrease over future audit periods.

Figure 11: Audited operative deaths with unplanned return to theatre compared to national data in 2012-2018



Note: n= 939 out of 6,139 patients had an unplanned return to theatre in 8,672 operative episodes reported from 1 July 2012 to 30 June 2018. Data not available: n=22.

See [Supplementary Report Appendix 10.15](#) for raw numbers for the above graph.

Comments:

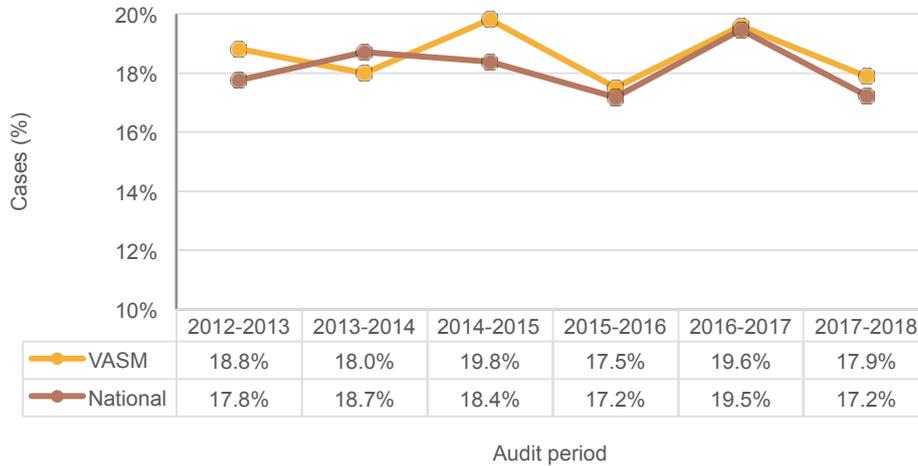
- From 1 July 2012 to 30 June 2018, 15.3% (939/6,139) of patients had an unplanned return to the operating room. Cardiothoracic surgery reported the highest unplanned return to theatre rate with 24.7% (192/778) of audited operative deaths in Victoria.
- In 2017-2018, surgeons reported an unplanned return to theatre in 14.8% (122/827) of patients in Victoria.
- These figures are slightly lower than the national data at 16.0% (2,554/16,012) in 2012-2018.
- For more details on unplanned return to the operating room see [Supplementary Report Appendix 10.15](#).

14.6 Unplanned Admission to Critical Care Unit

A seriously ill patient can be admitted to a CCU unexpectedly and this can indicate the care being provided needs to be addressed. In 2017-2018, the surgeons reported 17.9% of patients needed further critical care support.

Critical care management is an important area of clinical priority that the audit had been monitoring. Figure 12 illustrates that Victorian and national CCU management over time.

Figure 12: Audited deaths with unplanned admission to CCU compared to national data in 2012-2018



Note: n= 1,236 out of 6,633 patients had an unplanned admission to CCU in 8,672 operative episodes reported from 1 July 2012 to 30 June 2018.

Data not available: n=81.

CCU: critical care unit.

See [Supplementary Report Appendix 10.16](#) for raw numbers for the above graph.

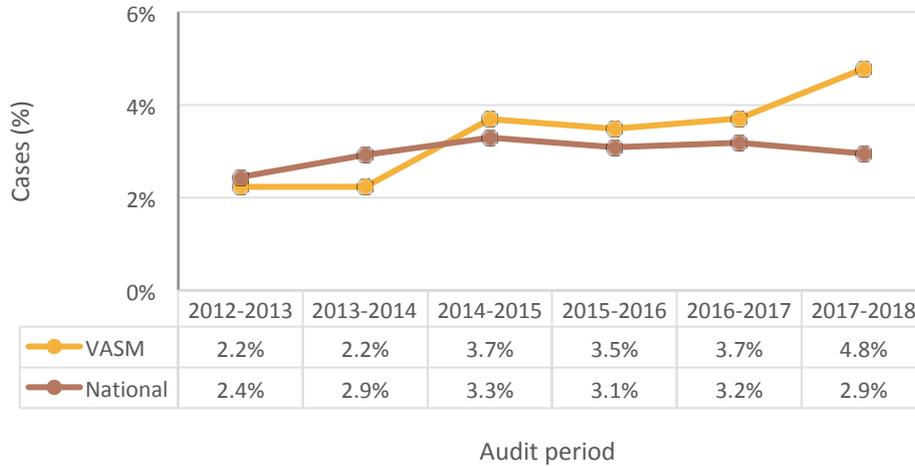
Comments:

- From 1 July 2012 to 30 June 2018, surgeons reported an unplanned admission to CCU in 18.6% (1,236/6,633) of audited deaths in Victoria, comparable to the national data at 18.2% (3,592/19,785).
- For more details on unplanned admission to CCU see [Supplementary Report Appendix 10.16](#).

14.7 Unplanned Readmission

An unplanned readmission to the hospital within 30 days of surgery can indicate a complication or further surgical intervention. From 1 July 2012 to 30 June 2018, there was a small proportion of patients who returned to hospital. Victorian and national rates were similar. In the current reporting period (2017-2018) there was a slight increase in the rate of patients readmitted to hospital compared with nationally.

Figure 13: Audited deaths with unplanned readmission compared to national data in 2012-2018



Note: n= 221 out of 6,614 patients who had an unplanned readmission reported from 1 July 2012 to 30 June 2018.

Data not available: n=100.

See [Supplementary Report Appendix 10.17](#) for raw numbers for the above graph.

Comments:

- From 1 July 2012 to 30 June 2018, surgeons reported an unplanned readmission at 3.3% (221/6,614) of cases in Victoria, which is comparable to the national rate over the same period at 3.0% (591/19,729).
- In 2017-2018, the rate is slightly higher for Victorian patients at 4.8% (42/880) who were readmitted to hospital compared to the national findings at 2.9% (80/2,717). VASM will be monitoring the reasons for the higher rates in Victoria to enable in the future reducing the rates leading to better outcomes for patients, increased quality of life and more effective utilisation of the health system's limited resources.
- For more details on unplanned readmission see [Supplementary Report Appendix 10.17](#).

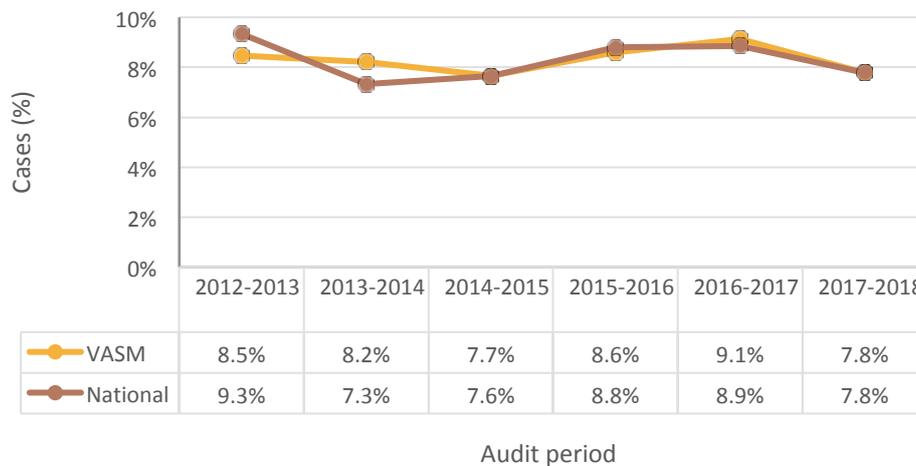
14.8 Issues with fluid balance

When a patient undergoes surgery, fluid balance must be maintained at optimum levels for the body to function at its normal state. From 1 July 2012 to 30 June 2018, the rate of issues with fluid balance was similar to that in the national audit findings. In 2017-2018, there was a slight decrease in fluid balance issues compared to the previous audit year.

Deciding on the optimum amount of intravenous fluids to be administered to surgical patients and the best rate at which to give them can be complex. The treatment decisions must be based on careful assessment of the patient's individual needs. The overall goal is to provide enough fluid and electrolytes to meet losses, maintain the normal status of body fluid compartments and enable renal excretion of waste products. Surgical consultants and clinical teams should be competent in fluid management strategies.

The treating surgeon and all assessors were asked to comment on the appropriateness of fluid balance during the episode of care.

Figure 14: Audited deaths with fluid balance issues compared to national data in 2012-2018



Note: n= 552 out of 6,630 patients had issues with fluid balance in 8,672 operative episodes reported from 1 July 2012 to 30 June 2018.
Data not available: n=84.

See [Supplementary Report Appendix 10.18](#) for raw numbers for the above graph.

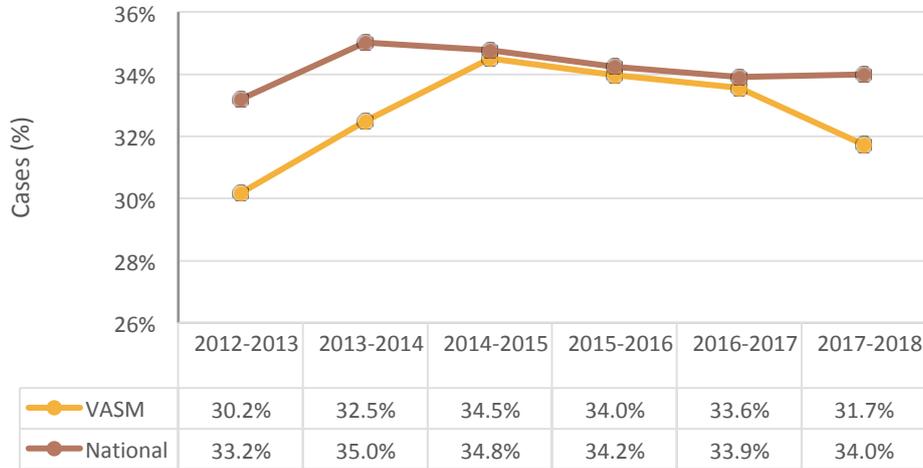
Comments:

- From 1 July 2012 to 30 June 2018, surgeons reported issues with fluid balance in 8.3% (552/6,630) of cases in Victoria which is the same as the national audit findings at 8.3% (1,638/19,758).
- In 2017-2018, surgeons reported 7.8% (69/887) of audited deaths in Victoria had fluid balance issues.
- The interaction between fluid balance and disease severity of the critically ill patient necessitates “early adequate fluid resuscitation together with conservative late fluid management may provide better patient outcomes”⁽²⁸⁾.
- For more details on fluid balance see [Supplementary Report Appendix 10.18](#).

14.9 Clinically significant infection

At the time of death, the patient can have an infection associated with the intervention provided by the hospital. Surgeons are asked to report on this clinical risk. From 1 July 2012 to 30 June 2018, the number of patients with infection associated with the surgery has continued to decrease over time; however, postoperative infection remains the top cause of infection.

Figure 15: Audited deaths with a clinically significant infection compared to national data in 2012-2018



Note: n= 2,160 out of 6,564 patients had clinically significant infection in 8,672 operative episodes reported from 1 July 2012 to 30 June 2018. Data collection on clinically significant infections commenced in 2011-2012.

Data not available: n=150.

See [Supplementary Report Appendix 10.19](#) for raw numbers for the above graph.

Comments:

- From 1 July 2012 to 30 June 2018, surgeons reported a clinically significant infection in 32.9% (2,160/6,564) of audited deaths in Victoria.
- In 2017-2018, 31.7% (279/879) of patients had a clinically significant infection in Victoria, which is slightly lower than found nationally, at 34.0% (925/2,721).
- For more details on clinical infection significance see [Supplementary Report Appendix 10.19](#).

Table 3: Audited deaths with clinically significant infection acquired during admission in 2012-2018

Infection acquired	2012-2017 VASM	2017-2018 VASM	2012-2017 National	2017-2018 National
Acquired postoperatively	71.3% (759/1,064)	74.2% (118/159)	67.1% (2,091/3,118)	71.2% (349/490)
Acquired preoperatively	16.5% (176/1,064)	14.5% (23/159)	17.9% (557/3,118)	17.1% (84/490)
Other invasive-site infection	4.9% (52/1,064)	5.0% (8/159)	7.0% (219/3,118)	5.5% (27/490)
Surgical-site infection	7.2% (77/1,064)	6.3% (10/159)	8.1% (251/3,118)	6.1% (30/490)

Note: n= 2,160 out of 6,564 patients had clinically significant infection in 8,672 operative episodes.
 Audit period reported from 1 July 2012 to 30 June 2018.
 Data collection on clinically significant infections commenced in 2011-2012.
 Data not available: n=150.

Comments:

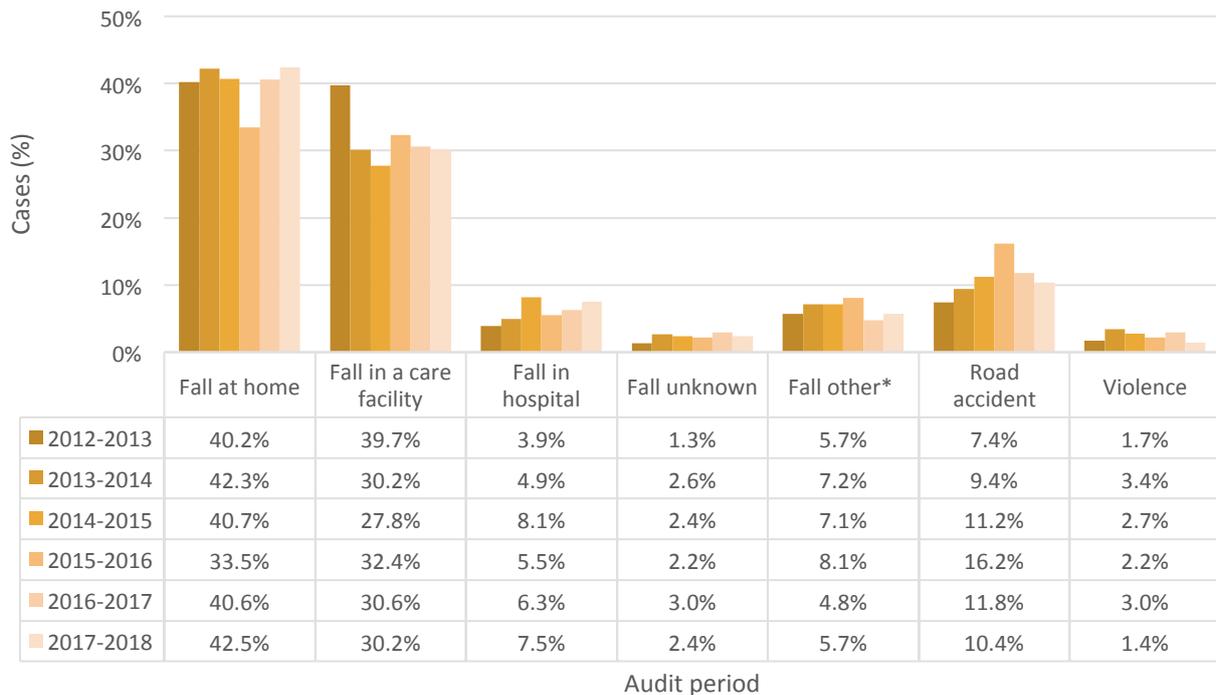
- Infection has been reported in 32.9% (2,160/6,564) of cases since data collection commenced for infections.
- From 1 July 2017 to 30 June 2018, most reported infections were acquired postoperatively. In Victoria this accounted for 74.2% (118/159) of infection cases, compared with 71.2% (349/490) nationally.
- Combined, pneumonia and sepsis comprised 68.6% (1,267/1,848) of the cases where infection was reported.
- The infective organism was identified in 31.7% (279/879) of the infection cohort.
- Antibiotic prophylaxis is a good infection control measure in surgery and should be considered.
- Strategies for reducing surgical-site infections have been implemented overseas and in Australia.⁽²⁹⁾
- The timeframe in which the infection was acquired can play a role in the patient’s recovery following the surgical procedure.
- The infection rate varied across individual specialties, reflecting their differing case mix. General surgery had the highest reported infection rate at 40.2% (947/2,357) followed by cardiothoracic surgery at 27.3% (244/893), neurosurgery at 17.7% (147/829) and vascular surgery at 22.8% (132/579).
- Surgical-site infections continue to decrease, from 7.2% (77/1,064) in the years 2012-2017 to 6.3% (10/159) in 2017 to 2018. There were similar findings in the national data pool.⁽³⁰⁻³³⁾

14.10 Trauma

Falls in hospital are monitored as might require further surgical or medical intervention. The trend from 1 July 2012 to 30 June 2018 shows that falls occur mostly at home and in care facilities. Preventative measures need to consider these sites as part of the healthcare strategic planning to reduce the number of falls.

The VASM started collecting data on trauma cases in 2012 to monitor trends, especially in falls. This monitoring system is to ensure strategies are implemented to prevent and minimise harm from trauma in the future. Trauma cases are those in which a patient received severe bodily injury or shock from a fall, accident or violence, as shown in the figure below.

Figure 16: Audited deaths with causes of trauma in 2012-2018



Note: n=1,611 trauma cases in 6,714 patients reported from 1 July 2012 to 30 June 2018.

*Includes roads and public venues.

Data not available: n=110.

See [Supplementary Report Appendix 10.20](#) for raw numbers for the above graph.

Comments:

- From 1 July 2012 to 30 June 2018, 24.0% (1,611/6,714) of mortalities reported since July 2012 were attributed to trauma.
- Of the traumatic events, 86.3% (1,333/1,544) were caused by falls, 11.2% (173/1,544) were caused by traffic accidents and 2.5% (38/1,544) were associated with violence.
- 37.7% (582/1,544) of falls occurred in hospitals or care facilities, while 39.8% (615/1,544) of falls occurred at home and only 6.5% (100/1,544) occurred elsewhere.
- The VASM surgical population is at an increased risk of falls due to the extent of life-threatening pre-existing conditions, comorbidities and frailty associated with advanced age. The 37.7% (582/1,544) of falls that are still occurring in hospitals or care facilities should be addressed and strategies implemented to reduce the number of falls in those locations.
- A review of patient care received by elderly patients undergoing surgery in the United Kingdom had similar findings.⁽¹⁹⁾ Future trend analysis of falls will help inform strategies for improvement in this aspect of patient care, especially falls in care facilities or in hospitals.⁽³⁴⁾
- The VASM would like to see a reduction in falls and will therefore include this in its educational programs. A study found a reduction in postoperative falls in patients who participated in a

preoperative education program.⁽³⁵⁾ Reviewing falls in trauma and orthopaedic cases can be a powerful tool to unite institutions motivated to assess changing demographics and standards of treatment, and ultimately institute change.⁽³⁶⁾ Therefore, similar educational strategies could be implemented at Victorian health care facilities.⁽³⁷⁾

- The treating surgeon was asked to provide information on patients who required inter-hospital transfer as part of their care. This included information on the timeliness, appropriateness of the transfer and record any perceived clinical issues associated with individual patient transfers.
- For more details on trauma cases see *Supplementary Report Appendix 10.20*.

Table 6: Trending of preventable clinical outcomes at each phase of care as assessed by a peer

Preventable clinical outcomes	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Adverse event or concern that was preventable and caused the outcome	1.8% (18/996)	2.4% (26/1,085)	2.0% (25/1,236)	2.4% (31/1,273)	2.9% (35/1,191)	1.9% (17/887)
Decision to operate at all	0.0% (0/996)	0.1% (1/1,085)	0.2% (2/1,236)	0.1% (1/1,273)	0.2% (2/1,191)	0.3% (3/887)
Preoperative care	1.1% (11/996)	0.6% (6/1,085)	0.9% (11/1,236)	1.1% (14/1,273)	1.0% (12/1,191)	1.5% (13/887)
Operative care	1.0% (10/996)	1.0% (11/1,085)	1.0% (12/1,236)	1.1% (14/1,273)	1.7% (20/1,191)	1.0% (9/887)
Postoperative care	1.2% (12/996)	1.2% (13/1,085)	1.0% (12/1,236)	1.2% (15/1,273)	1.3% (16/1,191)	0.7% (6/887)

Comments:

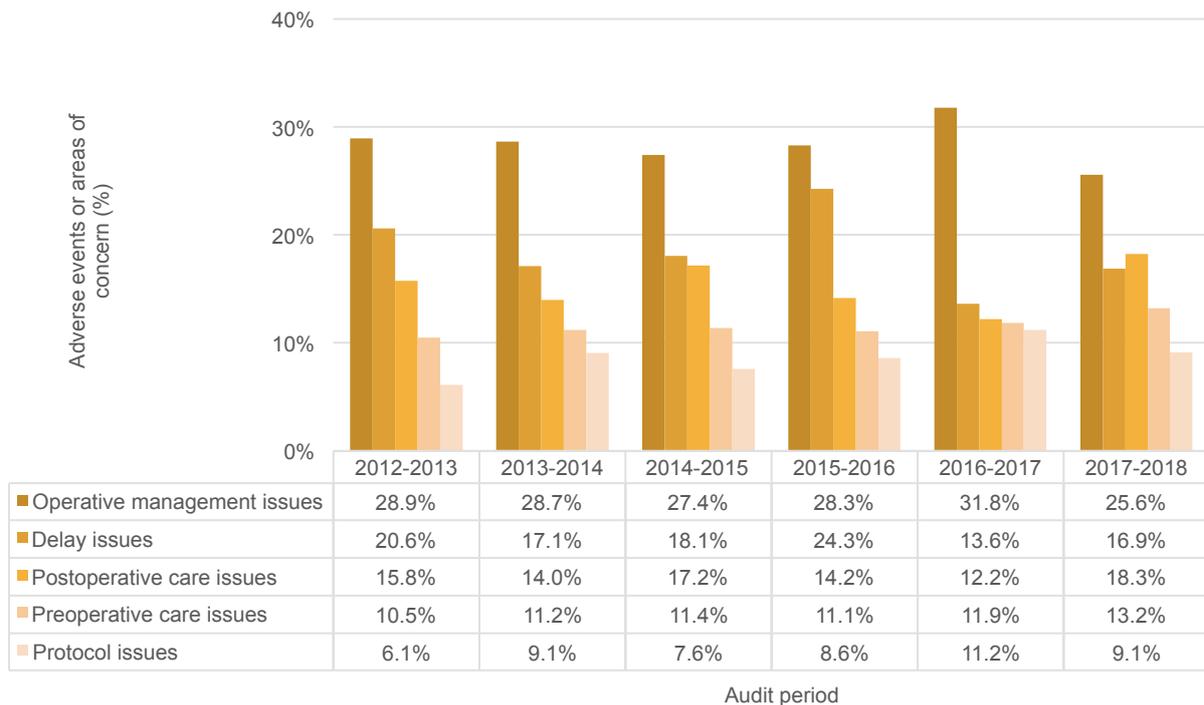
- Audited cases can have more than one clinical management issue identified for each patient. The percentage of patients affected is the important measure.
- Assessors perceived that clinical management issues occurred in 26.3% (233/887) of cases of the audit patient pool.
- Minor issues of patient management were perceived to have occurred in 14.1 % (125/887) of cases, and areas of concern were identified in 7.1% (63/887) of cases.
- In 2017-2018, 5.1% (45/887) of cases were identified from peer review where there was a clinical issue serious enough to be categorised as an adverse event.
- The rate preventability of adverse events or concerns has decreased slightly not reaching statistical significance from 2.9% (35/1,191) in 2016-2017 to 1.9% (17/887) in the current audit period.
- Assessors perceived more clinical issues than treating surgeons, which highlights the importance and value of an independent peer-review assessment. The prevalence of areas of concern and adverse events identified by assessors was similar among the specialties. Some specialties that have had few mortalities reported, or that recently commenced participating in the audit process, may skew the data.
- Trends in, and causes of, clinical management issues are monitored closely by the VASM and remain the focus of reports and educational events.
- The operative management issues include: decision to operate, timing of operation, preferably different choice of operation or procedure, a more limited surgery, organ injury, competence of surgical team, failure to stop haemorrhage, wrong approach used, and incorrect or inappropriate therapy.
- There was also criticism of the choice of operative procedure to perform or not to perform the procedure, decision to consider another operative approach, and performing less extensive procedures on frail patients with multiple comorbidities. The use of open versus laparoscopic procedures carries a higher incidence of anastomotic leaks, and the choice of the operative procedure can be crucial to reduce postoperative complications.

15.2 Frequency of clinical management issues

To encourage areas of improvement, the audit office actively disseminates problems identified from the data to clinicians and healthcare services via educational events, hospital forums, committee meetings, individual feedback letters to the treating surgeon, hospital governance reports, scientific papers and newsletters.

The frequency of specific clinical management issues is shown in the graph below. This figure outlines trends identified by second-line assessors across the audit period, focusing on issues identified as areas of concern or adverse events. If an assessor flags an area of concern or adverse event, it implies significant criticism. This section specifically focuses on clinical management issues identified by the assessor as being preventable. The higher the frequency of the clinical management issues the greater the need for strategies to improve surgical care in that particular clinical area.

Figure 17: Trends in top five areas of concern and adverse events in Second-Line Assessments in 2012-2018



Note: Audit period 1 July 2012 to 30 June 2018. n=1,687 clinical management issues identified as an adverse event or area of concern. Of these the top five clinical management issues identified were in 1,230 cases that went for SLA. More than one clinical management issue can be attributed to a case. The clinical issues were re-categorised as detailed in the [Supplementary Report Appendix 10.22](#).

Comments:

- Trends in and causes of clinical management issues are monitored closely by the VASM and remain the focus of reports and educational events. The most common clinical management issues in the 2012-2018 audit period were operative management issues (28.5%; 481/1,687), delay issues (18.6%; 313/1,687), postoperative care issues (15.2%, 256/1,687), preoperative care issues (11.5%, 194/1,687) and protocol issues (8.7%, 146/1,687).
- There was a slight decrease in delay issues in 2012-2017 with 18.8% (276/1,468) of cases compared to 16.9% (37/219) of cases in 2017-2018, however the trend indicates the same issues occurring over time. The delay category includes delays in areas such as: patient care, diagnosis, fully investigating the patient, patient presenting, recognising complications, transfer to surgical unit, transfer to tertiary hospital and starting medical treatment. The category also includes delay to operation caused by missed diagnosis and delay to surgery where an earlier operation was desirable.

- Futile surgery on sicker patients with multiple comorbidities has become a prominent clinical issue through the choice of operative procedures or the decision to operate. Recommendations from peer reviews suggested alternative treatment from other less extensive procedures or conservative management of patients to reduce postoperative complications.⁽⁷⁾
- For example, the use of open versus laparoscopic procedures can impact on the incidence of anastomotic leaks and the choice of the operative procedure can be crucial to reduce postoperative complications.⁽³⁸⁾
- A number of studies on hip fracture patients found that delay to surgery was attributable to patient factors such as age,⁽³⁹⁾ comorbidities,⁽⁴⁰⁾ ASA status, gender, day of surgical admission relating to delay to surgery,⁽⁴¹⁾ waiting times, and reduction of theatre changeover time.⁽⁴²⁾ These factors were previously reported, however it remains one of the top clinical management issues identified from the peer reviews.
- For more details on clinical management issues see [Supplementary Report Appendix 10.22](#).

15.3 VASM and national trend in areas of clinical management issues

From 1 July 2012 to 30 June 2018, all audited cases underwent a first-line peer review, with 15% referred for second-line peer review. The majority of clinical management issues were comparable between the VASM and the national audit findings. There were two areas of clinical management issues found to be clinically significant that the Victorian region improved on compared to the national findings. These were the decreased number of surgical deaths without usage of critical care units and the increased presence of a Senior Consultant in the operating theatre.

Table 7: Clinical management comparisons between VASM and National cumulative data in 2012 to 2018

Variable	VASM	National	National comparison	P value
Audited deaths with delay in surgical diagnosis	6.9% (463/6,680)	6.7% (1,346/20,053)	↑	0.536
Audited deaths with delay in transfer	9.6% (134/1,403)	10.6% (504/4,767)	↓	0.295
Audited deaths without use of intensive care (ICU) or high dependency unit (HDU)	34.2% (2,293/6,700)	37.2% (7,484/20,120)	↓	<0.001
Inappropriate DVT prophylaxis treatment as viewed by the assessor	1.6% (103/6,540)	1.7% (337/19,328)	↓	0.377
Proportion of elective admissions with elective surgery performed	86.9% (1,006/1,157)	87.2% (2,433/2,791)	↓	0.876
Operation with the consultant surgeon present in theatre	80.6% (6,992/8,672)	74.2% (16,875/22,756)	↑	<0.001
Audited operative deaths with postoperative complications	33.4% (2,041/6,105)	33.3% (5,334/16,022)	=	0.873
Audited operative deaths with unplanned return to theatre	15.3% (939/6,139)	16.0% (2,554/16,012)	↓	0.240
Audited deaths with unplanned admission to intensive care (ICU)	18.6% (1,236/6,633)	18.2% (3,592/19,785)	↑	0.388
Audited deaths with unplanned readmission	3.3% (221/6,614)	3.0% (591/19,729)	↑	0.162
Audited deaths with fluid balance issues	8.3% (552/6,630)	8.3% (1,638/19,759)	=	0.938
Audited deaths with a clinically significant infection	32.9% (2,160/6,564)	34.2% (6,722/19,637)	↓	0.050

Note: n=6,680 out of 6,714 patients with delays in surgical diagnosis. Denominator varies due to different criteria for each row.
 Data not available: n=34. Audit period 1 July 2012 to 30 June 2018.
 From 12 March 2015 the data collection changed from gathering data on both delay and errors in surgical diagnosis to focus only on delay.
 For more information, see [Supplementary Report Appendix 10.23](#).

15.4 Frequency of potentially preventable clinical outcomes

This section examines where assessors identified adverse clinical outcomes that were potentially preventable.

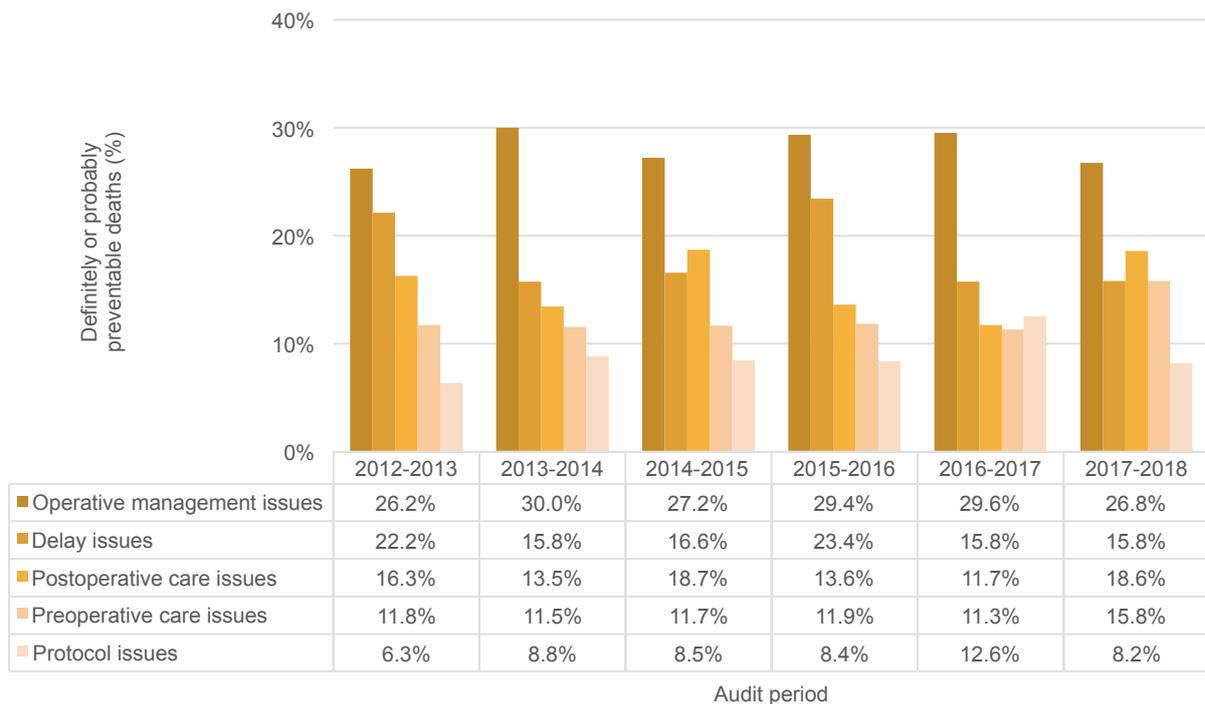
There is a slightly higher rate of preventable clinical outcomes in areas of concern and adverse events for the preoperative care cases with issues compared to the national audit findings.

Table 8: Preventable clinical outcomes at each phase of care as assessed by a peer in 2017-2018

Preventable clinical outcomes	VASM	National
Adverse event or concern that was preventable and caused the outcome	1.9% (17/887)	1.4% (39/2,726)
Decision to operate at all	0.3% (3/887)	0.4% (11/2,726)
Preoperative care	1.5% (13/887)	0.7% (20/2,726)
Operative care	1.0% (9/887)	0.8% (22/2,726)
Postoperative care	0.7% (6/887)	0.5% (13/2,726)

Note: For more information on trending and p values see [Supplementary Report Appendix 10.24](#).

Figure 18: Trends in top five preventable clinical outcomes in second-line assessments in 2012-2018



Note: n=1,687 forming the top 5 clinical outcomes identified as an adverse event or area of concern by assessors and 1,480 were recorded as probably or definitely preventable. Audit period 1 July 2012 to 30 June 2018. More than one clinical management issue can be attributed to one case.

The clinical issues were re-categorised and are detailed in the [Supplementary Report Appendix 10.24](#).

Comments:

- In Victoria the numbers of adverse events or areas of concern that were preventable and caused the outcome, as identified by the assessing surgeons through the peer review process, are greater than the national figures. This indicates that assessors use an unbiased robust clinical review process that can prove catalyst for clinical governance management in surgical health services.
- From 1 July 2012 to 30 June 2018, the most common preventable clinical management issues were operative management issues at 28.3% (419/1,480) and delay issues at 18.4% (272/1,480).
- Preventable delay issues saw the largest decrease, dropping from 18.7% (243/1,297) in 2012-2017 to 15.8% (29/183) in 2017-2018.
- Preventable postoperative care issues increased slightly over time from 14.8% (192/1,297) in 2012-2017 to 18.6% (34/183) in 2017-2018.
- Preventable operative management issues also decreased slightly from 28.5% (370/1,297) in 2012 to 2017 to 26.8% (49/183) in 2017-2018. Ongoing review and monitoring of patient management is needed for reducing cases with preventable mortality.⁽⁴³⁾
- In the current audit period, 1 July 2017 to 30 June 2018, there were five hospitals identified with above the national mean of cases with preventable clinical management issues. They have been advised to further investigate their surgical care, and the clinical management issues identified for their sites.

16. Abbreviations

ANZASM	Australian and New Zealand Audit of Surgical Mortality
ANZCA	Australian and New Zealand College of Anaesthetists
AOA	Australian Orthopaedic Association
ASA	American Society of Anaesthesiologists
CCOPMM	Consultative Council on Obstetric and Paediatric Mortality and Morbidity
CCU	Critical care unit / critical care utilisation
CMI	Clinical management issue
CPD	Continuing professional development
DHHS	Department of Health and Human Services
DRG	Diagnosis-related group
DVT	Deep vein thrombosis
FLA	First-line assessment
GI	Gastrointestinal
Hrs	Hours
NOD	Notification of death
NSQHS	National Safety and Quality Health Service
PE	Pulmonary embolism
RACS	Royal Australasian College of Surgeons
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
SCF	Surgical case form
SCV	Safer Care Victoria
SLA	Second-line assessment
TED	Thrombo-Embolic Deterrent
VAED	Victorian Admitted Episodes Dataset
VASM	Victorian Audit of Surgical Mortality
VCCAMM	Victorian Consultative Council on Anaesthetic Mortality and Morbidity
VPCC	Victorian Perioperative Consultative Committee
VTE	Venous thromboembolism

17. References

1. Aspex Consulting. Review of the Victorian Audit of Surgical Mortality Melbourne: *Royal Australasian College of Surgeons*; 2018 [Available from: <https://www.surgeons.org/media/25748546/2018-12-06-aspx-final-report.pdf>].
2. Meara JG, Leather AJ, Hagander L, Alkire BC, Alonso N, Ameh EA, et al. Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development. *Lancet*. 2015;386(9993):569-624.
3. Victorian Audit of Surgical Mortality. Case Note Review Booklet Melbourne: *Royal Australasian College of Surgeons*; 2016 [8: [Available from: <https://www.surgeons.org/for-health-professionals/audits-and-surgical-research/anzasm/vasm/#CNRB>].
4. Victorian Audit of Surgical Mortality. Reports and publications: Annual Reports Melbourne: *Royal Australasian College of Surgeons*; 2019 [Available from: https://www.surgeons.org/for-health-professionals/audits-and-surgical-research/anzasm/vasm/#Reports_and_Publications].
5. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards: Second edition Sydney: *Australian Commission on Safety and Quality in Health Care*; 2019 [Available from: <https://www.safetyandquality.gov.au/wp-content/uploads/2017/12/National-Safety-and-Quality-Health-Service-Standards-second-edition.pdf>].
6. Victorian Audit of Surgical Mortality. Case Note Review Booklet Melbourne: *Royal Australasian College of Surgeons*; 2019 [Available from: <https://www.surgeons.org/for-health-professionals/audits-and-surgical-research/anzasm/vasm/#CNRB>].
7. Royal Australasian College of Surgeons. End of life care Melbourne: *Royal Australasian College of Surgeons*; 2017 [Available from: https://www.surgeons.org/media/24971463/2017-07-28_pos_fes-pst-057_end_of_life_care.pdf].
8. Australian Commission on Safety and Quality in Health Care. Preventing Falls and Harm from Falls in Older People: Best Practice Guidelines 2009 Sydney: *Australian Commission on Safety and Quality in Health Care*; 2016 [Available from: <http://www.safetyandquality.gov.au/our-work/falls-prevention/falls-prevention-resources/>].
9. Australian Commission on Safety and Quality in Health Care. Australian Guidelines for the Prevention and Control of Infection in Healthcare 2010 Sydney: *Australian Commission on Safety and Quality in Health Care*; 2016 [Available from: <http://www.safetyandquality.gov.au/our-work/healthcare-associated-infection/national-infection-control-guidelines/>].
10. Department of Health & Human Services. Victorian Admitted Episodes Dataset: 2017-18 VAED manual State of Victoria: *Department of Health & Human Services*; 2017 [Available from: <https://www2.health.vic.gov.au/hospitals-and-health-services/data-reporting/health-data-standards-systems/data-collections/vaed>].
11. American Society of Anesthesiologists (ASA). ASA Physical Status Classification System Park Ridge, Illinois. 2017 [Available from: <http://www.asahq.org/resources/clinical-information/asa-physical-status-classification-system>].
12. Carpenter B, Tait G, Jonsson L, Peschl H, Naylor C, Bermudez-Ortega A. The role of coronial autopsies in a context of decreasing hospital autopsies: an investigation of the issues. *J Law Med*. 2010;18(2):402-12.
13. Zardawi I. Coronial autopsy in a rural setting. *J Forensic Leg Med*. 2013;20(7):848-51.
14. Neate S, Bugeja L, Jelinek G, Spooner H, Ding L, Ranson D. Non-reporting of reportable deaths to the coroner: when in doubt, report. *MJA*. 2013;199(6):402-5.
15. Sutherland G, Kemp C, Bugeja L, Sewell G, Pirkis J, Studdert DM. What happens to coroners' recommendations for improving public health and safety? Organisational responses under a mandatory response regime in Victoria Australia: *BioMed Central*; 2014 [Available from: <http://www.biomedcentral.com/1471-2458/14/732>].
16. Pham C, Gibb C, Field J, Gray J, Fitridge R, Marshall V, et al. Managing high-risk surgical patients: modifiable co-morbidities matter. *ANZ J Surg*. 2014;84(12):925-31.

17. Charles A, Cross W, Griffiths D. What do clinicians understand about deaths reportable to the Coroner? *J Forensic Leg Med.* 2017;51:76-80.
18. Hansen D, Retegan C, Woodford N, Vinluan J, Beiles CB. Comparison of the Victorian Audit of Surgical Mortality with coronial cause of death. *ANZ J Surg.* 2015;86(6).
19. Wilkinson K, Martin IC, Gough MJ, Stewart JAD, Lucas SB, Freeth H, et al. An Age Old Problem: A review of the care received by elderly patients undergoing surgery. *National Confidential Enquiry into Patient Outcome and Death* [Internet]. 2010:[1-17 pp.]. Available from: http://www.ncepod.org.uk/2010report3/downloads/EESE_fullReport.pdf.
20. Rural Doctors Association of Victoria [Internet]. Retrieval: Victorian rural emergency retrieval Victoria: *Rural Doctors Association of Victoria*; 2011 [updated 20 May 2008; cited 2011 28 November 2011]. Available from: <http://www.rdav.com.au/>.
21. Royal Australasian College of Surgeons. Rural Surgery Melbourne The Royal Australasian College of Surgeons; 2019 [Available from: <https://www.surgeons.org/member-services/interest-groups-sections/rural-surgery>].
22. Evans SM, Bohensky M, Cameron PA, McNeil J. A survey of Australian clinical registries: can quality of care be measured? *Intern Med J.* 2011;41(1a):42-8.
23. NHMRC Centre for Research Excellence in Patient Safety (CREPS), National E-Health Transition Authority (NEHTA), Monash University. Operating Principles and Technical Standards for Australian Clinical Quality Registries. *Australian Commission on Safety and Quality in Health Care.*; 2008.
24. National Health and Medical Research Council. Prevention of Venous Thromboembolism (VTE) in Patients Admitted to Australian Hospitals: guideline summary Melbourne: *National Health and Medical Research Council*; 2010 [Available from: http://www.nhmrc.gov.au/files_nhmrc/publications/attachments/cp115a_vte_clinician_summ.pdf].
25. National Health and Medical Research Council. *Clinical practice guideline for the prevention of venous thromboembolism in patients admitted to Australian hospitals.* Melbourne: National Health and Medical Research Council 2009.
26. Curtis AJ, Wolfe R, Russell CO, Elliott B, Hart JAL, McNeil J. Determining priority for joint replacement: comparing the views of orthopaedic surgeons and other professionals. *MJA.* 2011;195(11/12):699-702.
27. Tran HA, Gibbs H, Merriman E, Curnow JL, Young L, Bennett A, et al. New guidelines from the Thrombosis and Haemostasis Society of Australia and New Zealand for the diagnosis and management of venous thromboembolism. *Med J Aust.* 2019;210(5):227-35.
28. Shum HP, Lee FMH, Chan KC, Yan WW. Interaction between fluid balance and disease severity on patient outcome in the critically ill. *J Crit Care.* 2011;26(6):613-9.
29. Worth LJ, Bull AL, Spelman T, Brett J, Richards MJ. Diminishing surgical site infections in Australia: time trends in infection rates, pathogens and antimicrobial resistance using a comprehensive Victorian surveillance program, 2002-2013. *Infect Control Hosp Epidemiol.* 2015;36(4):409-16.
30. Royal Australasian College of Surgeons. Prevention of Healthcare Associated Infection in Surgery Melbourne: *Royal Australasian College of Surgeons*; 2015 [Available from: http://www.surgeons.org/media/297157/2015-05-20_pos_fes-pst-009_prevention_of_healthcare_associated_infection_in_surgery.pdf].
31. Worth LJ, Spelman T, Bull AL, Richards MJ. A major reduction in hospital-onset Staphylococcus aureus bacteremia in Australia: a question of definition. *Clin Infect Dis.* 2014;59(12):1808-9.
32. Worth LJ, Spelman T, Bull AL, Richards MJ. Staphylococcus aureus bloodstream infection in Australian hospitals: findings from a Victorian surveillance system. *Med J Aust.* 2014;200(5):282-4.
33. Allen J, Rey-Conde T, North JB, Kruger P, Babidge WJ, Wysocki AP, et al. Processes of care in surgical patients who died with hospital-acquired infections in Australian hospitals. *J Hosp Infect.* 2017.
34. Cunningham J WD, Robinson KM and Paul L,. A comparison of state and national Australian data on external cause of injury due to falls. *Health Information Management Journal.* 2013;42(3).
35. Clarke HD, Timm VL, Goldberg BR, SJ H. Preoperative Patient Education Reduces In-hospital Falls After Total Knee Arthroplasty. *Clin Orthop Relat Res.* 2012;470(1):244-9.

36. Tarrant SM, Balogh ZJ. Low-energy falls. *ANZ J Surg.* 2015;85(4):202-3.
37. Australian Institute of Health and Welfare. Australian hospital statistics 2015-2016, Canberra: *Australian Institute of Health and Welfare*; 2016 [Available from: <https://www.aihw.gov.au/reports/hospitals/ahs-2015-16-admitted-patient-care/contents/table-of-contents>].
38. Luján JJ, Németh ZH, Barratt-Stopper PA, Bustami R, Koshenkov VP, Rolandelli RH. Factors influencing the outcome of intestinal anastomosis. *The American Surgeon.* 2011;77(9):1169-75.
39. Shiga T, Wajima Z, Ohe Y. Is operative delay associated with increased mortality of hip fracture patients? Systematic review, meta-analysis, and meta-regression. *Can J Anaesth.* 2008;55(3):146-54.
40. Hauck K, Zhao X, Jackson T. Adverse event rates as measures of hospital performance. *Health Policy.* 2011.
41. Ricci WM, Brandt A, McAndrew C, Gardner MJ. Factors Effecting Delay to Surgery and Length of Stay for Hip Fracture Patients. *J Orthop Trauma* [Internet]. 2014 Sep 2. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/25186844>.
42. Soliman BAB, Stanton R, Sowter S, Rozen WM, Shahbaz S. Improving operating theatre efficiency: an intervention to significantly reduce changeover time. *ANZ J Surg.* 2012;83:545-8.
43. Gupta M, Fuchs B, Cutilli C, Cintolo J, Reinke C, Kean C, et al. Preventable mortality: does the perspective matter when determining preventability? *J Surg Res.* 2013;184(1):54-60.

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